

THE FORESTS OF INDIA

VOLUME II

BY THE SAME AUTHOR

THE FORESTS OF INDIA Vol. I

THE DIARY OF A SPORTSMAN-
NATURALIST IN INDIA

STALKS IN THE HIMALAYAS

JUNGLE BY-WAYS IN INDIA

AT THE SERBIAN FRONT IN
MACEDONIA

FROM CZAR TO BOLSHEVIK

THE BODLEY HEAD

THE FORESTS OF INDIA. BY E. P. STEBBING

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F.R.G.S. WITH ILLUSTRATIONS FROM
PHOTOGRAPHS. IN THREE VOLUMES

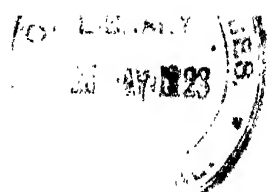
VOL. II

THE DEVELOPMENT OF THE
INDIAN FOREIGN SERVICE

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PREFACE

AS intimated in Volume I, it was hoped to complete the History of the Forests of India and the Development of the Forest Service up to 1920 in two volumes. The large amount of material which has become available from the India Office Records and other papers and Reports so kindly forwarded to me from India by officers of the Department at the instance of Mr. P. H. Clutterbuck, C.I.E., C.B.E., Inspector-General of Forests, has rendered this impossible if the object aimed at—that the history should be comprehensive—is to be achieved.

I have become strongly impressed with the conviction that this history of the progress in the scientific conservancy of the Forests of India will prove of value to Forest Officers throughout our Empire, if not, as I now believe, throughout the world. But to achieve this aim and to attain the full benefit of the object-lessons it provides, it has become necessary to trace with some care and considerable detail the steps by which the present remarkable development of the management in India has been brought about.

One factor has come into prominence in the treatment of the history so far dealt with. The periods of years in the several Parts vary considerably. For instance, a considerable portion of Volume I was devoted to the history of the years 1857–1864. In the present volume the greater part is devoted to the period 1865–1870. The total number of years in the two periods amounts to fourteen only. But these fourteen years witnessed the true foundation of Forest Conservancy in the different provinces of the Indian Empire. The work which was undertaken during the period 1871–1900 was the natural corollary and outcome of the lines laid down between 1857–1870. The study of this latter period by the younger Forest

Services of the Dominions and the Administrations under the Colonial Office will, it is believed, prove of incalculable benefit.

In a subsequent Volume it is proposed to devote Part I to a summary of the chief developments in progress made in each of the several Presidencies and Provinces between 1871-1900, the remaining Parts dealing with the remarkable progress made in administrative and professional work, in research, and their bearing on the upward trend of the revenue, during the periods 1901-1910 and 1911-1920.

At the present juncture attention may be drawn to one point which this history demonstrates beyond possibility of dispute. Each reorganization and increase of the staff, coupled with enhanced budget grants, made for the development of the forests, was quickly followed by a considerable increase in the gross and net revenues. Had more liberality been exhibited in these matters at an earlier date there seems to be little doubt that the present revenue could have reached a higher figure. For instance, for the quinquennial period 1864-1869 the gross revenue amounted to R37,40,000, the expenditure to R23,80,000, and the net surplus to R13,60,000; for the period 1884-1889 the respective figures were R116,70,000, R74,30,000, R42,40,000; and for the period 1894-1899 R172,00,000, R98,00,000 and R79,20,000. By 1919-1920 this latter revenue had trebled.

The evidence to hand should form a valuable object-lesson both in India and to the Administrations responsible for the other Forest Services of the Empire.

Although this history is not yet completed, at the present juncture it may be added that a firm foundation has been laid by the Department. The care of this magnificent Forest Estate has now been handed over to the Provincial Councils. Its future, and with it the well-being of millions of Indians, will depend on the nature of the building erected on these foundations. Intimately connected with this aspect is the question of the education of the Superior or Imperial Staff of the Department. The highest form of training and efficiency will be demanded from its members if the great progress

achieved is to be maintained and, incidentally, a gradually enhanced revenue secured.

A full glossary of Indian words is appended to this volume.

I would again wish to offer my thanks to the Secretary of State for India and to the Government of India for the assistance afforded me by the permission to make use of old records, Reports, etc.; as also to the Staff of the India Office for their unwearying assistance and courtesy.

For the loan of photographs for reproduction in this volume my thanks are due to Professor W. Wright Smith, The Royal Botanic Gardens, Edinburgh; Mr. H. Jackson, Cambridge School of Forestry; Mr. and Mrs. King Adams, of the India Civil Service; and Sir Sainthill Eardley Wilmot, K.C.I.E. The remainder are either my own or reproduced by permission of the Honorary Editor of the *Indian Forester*. To my friend, Sir Sainthill, my thanks are also due for so kindly reading through the proofs of this volume.

E. P. STEBBING

THE UNIVERSITY OF EDINBURGH,

October 27th, 1922.

CONTENTS OF VOLUME II.

PART I

THE INAUGURATION OF THE INDIAN FOREST SERVICE AND A SCIENTIFIC CONSERVANCY OF THE FORESTS

CHAPTER	PAGE
I. THE INTRODUCTION OF A FOREST ORGANISATION AND METHODICAL SYSTEM OF MANAGEMENT INTO THE FORESTS OF THE COUNTRY, 1864-1870	3
II. THE TRAINING OF FOREST PROBATIONERS FOR INDIAN SERVICE, 1864-1870. THE INITIATION OF CONTINENTAL TRAINING BY BRANDIS	42
III. THE PROGRESS OF FOREST ADMINISTRATION IN THE MADRAS PRESIDENCY, INCLUDING MYSORE AND COORG, 1865-1870	90
IV. THE PROGRESS OF FOREST CONSERVANCY IN THE BOMBAY PRESIDENCY, INCLUDING SIND, 1865-1870	134
V. THE PROGRESS OF FOREST CONSERVANCY IN BRITISH BURMA, 1865-1870	181
VI. THE PROGRESS OF FOREST CONSERVANCY IN THE CENTRAL PROVINCES, 1865-1870	215
VII. THE PROGRESS OF FOREST CONSERVANCY IN THE PUNJAB, 1865-1870	255
VIII. THE INTRODUCTION OF FOREST CONSERVANCY INTO THE ● NORTH-WEST PROVINCES AND OUDH, 1865-70.	292
IX. THE INTRODUCTION OF FOREST CONSERVANCY INTO THE NORTH-WEST PROVINCES AND OUDH, 1865-70 (<i>continued</i>). PEARSON'S REPORTS ON THE HIMALAYAN AND PLAINS FORESTS OF THE NORTH-WEST PROVINCES	316
X. THE INTRODUCTION OF FOREST CONSERVANCY INTO THE NORTH-WEST PROVINCES AND OUDH, 1865-1870 (<i>con- tinued</i>). CONSERVANCY IN OUDH	353
XI. FOREST OPERATIONS IN BENGAL AND ASSAM, 1865-1870	371
XII. FOREST OPERATIONS IN BENGAL AND ASSAM (<i>continued</i>)— THE FORESTS OF THE CHITTAGONG DISTRICT, CHITTAGONG HILL TRACTS AND LUSHAI	432

PART II

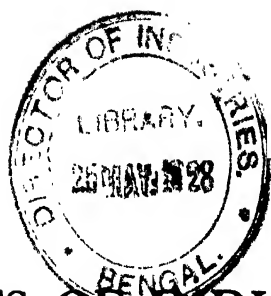
THE PROGRESS OF FOREST CONSERVANCY AND THE DEVELOPMENT OF THE FOREST DEPARTMENT IN INDIA, 1871-1900

CHAPTER	PAGE
XIII. A BRIEF REVIEW OF HISTORICAL FACTORS AND ADMINISTRATIVE ACTS AFFECTING THE PROGRESS OF FOREST CONSERVANCY, 1871-1900	445
XIV. THE PROGRESS OF FOREST ADMINISTRATION, 1871-1900 .	461
XV. THE ORGANISATION AND EDUCATION OF THE STAFF OF THE DEPARTMENT, 1871-1900	485
XVI. THE PROGRESS MADE IN METHODS OF EXPLOITATION AND IN THE CONSTRUCTION OF COMMUNICATIONS AND BUILDINGS, 1871-1900	510
XVII. THE PROGRESS MADE IN THE PROTECTION OF THE FORESTS, 1871-1900	533
XVIII. THE FORMATION OF PLANTATIONS AND THE IMPROVEMENT OF THE FOREST CROPS, 1871-1900	563
XIX. THE INTRODUCTION AND GROWTH OF FOREST WORKING PLANS IN INDIA, 1871-1900	592
XX. INDIAN FOREST LITERATURE AND RESEARCH, 1850-1900 .	601
XXI. AN APPRECIATION OF THREE INSPECTORS-GENERAL OF FORESTS, 1863-1900	612

ILLUSTRATIONS, VOLUME II

The Royal Indian Engineering College, Cooper's Hill. The Training College of the Indian Forest Service Probationers, 1885-1905	<i>Frontispiece</i>
	<i>To face page</i>
Map of India	1
<i>Bombax malabaricum</i> showing the development of buttresses, North-West Provinces	12
Cypress trees (<i>Cupressus torulosa</i>) at Naini Tal, North-West Provinces	28
Donkeys carrying charcoal from the forest to the market, North-West Provinces	94
Corner of a garden at Labdah, near Mungpoo, Government Cinchona Plantation, Darjiling District, Bengal, elevation 3000 feet. Mungpoo Peak is seen in the middle distance. Bamboos, <i>Cryptomeria japonica</i> and tree ferns in foreground	118
The 100-foot cleared fire line separating the British and Baroda State Forests, Bombay	136
The cleared fire line between the forest and village lands, Bombay. The pile of stones is a cheap form of boundary pillar	136
A typical example of a mixed forest, Burma	182
A typical view of the bamboo forest, Burma	202
A local type of cart termed a "sagar." Carries 2-4 sâl sleepers according to whether it is drawn by buffaloes or bullocks. Singbhum, Chota Nagpur	236
A Lalitpur river, North-West Provinces. Owing to the denudation of the forests on the Catchment Area the river is a raging torrent in the monsoon and almost dry at other seasons. A good example of the waste of water and consequently of hydraulic power	296
Konain Forest Rest House, Jaunsar, North-West Himalaya. The surrounding forest is deodar (<i>Cedrus deodara</i>)	300
The Ramganga Valley, showing the sâl forests, North-West Provinces, December, 1888	318
The remnants of an old sâl forest. The trees now stand on waste savannah land. The Patli Dun, North-West Provinces, April, 1889	320
Looking up the Tons River from Thadiar. The forest on the lower slopes of the hills is chir pine (<i>Pinus longifolia</i>). The hills in the background are clothed with deodar	342
Very typical mixed forest in Independent Sikkim. Elevation 4000-7000 feet. The stream is a tributary of the Great Rungeet, not far from the Monastery of Pemionchi. The view is taken lower down between Chakung and Rinchingpong	372
The Sâl Forests in the Tista Valley, looking north up the river. The Bhutan side, now British, is on the right of the picture	374
View taken at sunrise near Tongloo Bungalow, to the west of Darjiling. Elevation 9000-10,000 feet. Rhododendrons in the foreground. In the distance is Kinchinjunga, 28,150 feet. The intervening forest-clad country is under rolling clouds	378

	<i>To face page</i>
Singbhum Sál Forests, Chota Nagpur, showing type of rough mud or rock export road through forest. A bullock "sagar" loaded with sleepers taking the declivity into the nullá at full trot; their ordinary pace is a walk—a slow one! 1897.	392
The Sál Forest on the Great Rungeet River above its junction with the Tista River. 1500 feet elevation. British Sikkim on the left	408
The Sál Forest in the Terai at the foot of the Darjiling Hills near Sookma, Bengal	412
View near Chakung, Sikkim, 4000 feet. With Kinchinjunga, 28,150 feet, in background. A pahari (hill man) hut with a field of maize in foreground. Maling bamboos (<i>A. racemosa</i>) on the right	422
View of the Chittagong Hill Tracts and the Karnafuli River from Rungamatti	434
The Imperial Forest School, Dehra Dun, India. The first Forestry School to be inaugurated in the British Empire	504
A forest scene, Konain, Jaunsar, North-West Himalaya. This photograph exhibits the type of Deodar Forest visited by the Dehra Dun School students on their practical courses	508
Converting sál logs into sleepers with the cross-cut saw in the Singbhum Forests, Chota Nagpur, May, 1897	514
Unloading railway sleepers at a railway depot. The cart is an improved type of "sagar." Manharpur, Singbhum, 1897	516
Buffaloes loaded with sál timber crossing the Ramganga River, North-West Provinces, en route from forest, January, 1890	518
Deodar sleeper coming down a steep gradient in a wet slide. Kulni, Jaunsar, North-West Himalaya. The water in the slide prevents heating through excessive friction and reduces the danger of the sleeper "jumping" the slide	520
Thadiar on the Tons River in the Tehri Garhwal leased forests (North-West Himalaya) from which great quantities of deodar and chir timber (scantlings) were floated to the Jumna River, where they were caught at the boom of Dakhpáthar, made into rafts and taken to Delhi. The suspension bridge is one of the older pattern built over the Hill Rivers (<i>circa</i> 1888)	524
Typical example of the forest on a hill-side in Sikkim destroyed by fire. The ground is becoming covered with the Maling bamboo (<i>Arundinaria racemosa</i>). Toungloo Ridge, 8800 feet. Rungeet Valley below	534
The Kalmoi Fire Observation Station, Surat Forests, Bombay. Note the Observer's post in the tree and the big drum by means of which warning of an outbreak of fire is sent out. The Notices of Fire Regulations are posted on the hut	546
The Nilumbur Teak Plantations, Madras. A plantation about fifty years old (cf. with plate facing p. 97, Vol. I)	566
<i>Eucalyptus globulus</i> Plantation in the Nilgiri Hills, Madras	568
Changa Manga Plantation, Punjab. Young two-year-old Sissu coppice with standards	572
Portion of a six and a half year old patch of Teak sowings in flowered <i>Dendrocalamus strictus</i> . Bwet Reserve, Burma	584
Chir Pine (<i>Pinus longifolia</i>) Forest showing natural regeneration in the foreground. Lodhi, Kumaun, North-West Provinces, October, 1890.	590



THE FORESTS OF INDIA

CHAPTER I

THE INTRODUCTION OF A FOREST ORGANISATION AND
METHODICAL SYSTEM OF MANAGEMENT INTO THE FORESTS
OF THE COUNTRY, 1864-1870

IN the previous volume the gradual stages by which the recognition of the value of the Forest Estate in India became apparent to the Government have been reviewed. The forests over considerable tracts of the country had been cleared. Much of the remainder in the accessible parts of the Provinces which had been worked for supplying Government requirements and for trade purposes was in a devastated and ruined condition. In the wilder parts of the country occupied by the aboriginal tribes the forests were almost unknown, even the existing maps of the country, as already mentioned, showing them as "unexplored." It was surmised that considerable areas in these regions would prove to have been destroyed by the system of shifting cultivation practised by the aboriginals, but no certainty existed as to how far these regions contained large amounts of timber which, though at present inaccessible, would be capable of exploitation with the increase of population and the opening out of communications. Throughout large areas unchecked devastation and exploitation still reigned, with its concomitants of firing the forests and unrestricted grazing. Added to these the decrease in large timber, required in increasing amounts by the railways and public services, with the rising price, were causing considerable alarm; whilst a new demand was being made by the former for fuel for the engines, a demand whose extent in the future could not be estimated. It was with the object of checking this state of affairs and taking the first steps in introducing Forest Conservancy that the Govern-

ments of some of the Provinces had already commenced to appoint Conservators of Forests and provide them with staffs. The recognition by the Secretary of State and the Government of India (*vide* Vol. I, Chap. XXVIII) of the grave position of the accessible forests of the country which were threatened with total annihilation unless prompt steps were taken to check the abuses to which they were subjected, found expression in the appointment of Brandis in 1864 to act as adviser to the Government of India with the designation of Inspector-General of Forests.

Before dealing with the steps taken by Government under Brandis' advice to introduce a proper forest organisation into the country, it will be necessary to glance briefly at certain events in the administration of India which were not without their influence on the growth of a forest policy.

Lord Elgin became Viceroy in 1862, but died in India after a year of office, being buried in Dharmasala. During the period the Umbeyla campaign took place on the North-West frontier. After some disasters the operations were brought to a fairly satisfactory conclusion towards the close of 1863. The Home Government, however, were very dissatisfied with the conduct of this campaign, and to this reason is attributed the selection as Governor-General of a member of the Indian Civil Service in the person of Sir John (afterwards Lord) Lawrence, known as the Saviour of the Punjab. Sir John Lawrence held the position till 1869, when he was succeeded by Lord Mayo. The process of reconstruction after the Mutiny storm, commenced by Lord Canning, the predecessor of Lord Elgin, was continued by Lawrence, who made it his business in the words of the Queen's Proclamation "to stimulate the peaceful industry of India, to promote works of public utility and improvement, and to administer the government for the benefit of all Her Majesty's subjects." The Government of India, therefore, during the period dealt with in this part, was almost wholly concerned with matters of internal administration. To this cause is undoubtedly attributable the remarkable progress which was made in the introduction of forest conservancy into almost all the Provinces and local administrations under that Government.

The war with Bhutan, a small hill State on the frontier of Bengal in the Eastern Himalaya, which was in progress as already mentioned (Vol. I, p. 515), was concluded in 1865 by a treaty which enforced the cession of a strip of territory

about 180 miles long and from 20 to 30 broad, situated to the east of the Tista River. This country contained an area of very fine sâ forests in the Duars situated at the foot of the hills and stretching up into the foot-hills.

In the north, at the death of the aged Amir Dost Mahomed of Afghanistan, Lawrence refused to interfere, and left the relatives of the dead Amir to fight amongst themselves for the succession. At length in 1868 a younger son, Sher Ali, won and was then recognised by the Government of India. The policy of non-intervention had not been regarded with a friendly eye by the Afghan Chiefs, and it was left to Lord Mayo to establish warmer relations with the new Amir. This step was regarded as a necessity owing to the fact that Russia was making such rapid strides in Central Asia as to threaten the safety of India, a menace which was to hang over the northern frontier as a dark thunder-cloud for many years thereafter. One of the most disastrous occurrences during the period, which ultimately in conjunction with other causes was to have a considerable influence on the administration of the forests, was what is known as the Orissa famine, resulting from the failure of the rains in 1865. In reality this famine was not confined to Orissa, then a division of Bengal, but extended along the whole of the eastern coast from Calcutta to Madras and penetrated far inland. The districts of Manbhum and Singbhum in Chota Nagpur, as well as the Ganjam district of Madras, suffered severely. Lord Harris was Governor of Madras and dealt effectively with the districts under his jurisdiction. The Bengal Government, however, failed conspicuously, a failure from which the Government of India cannot be disassociated. The Orissa division was an isolated one, the position being described at the period as "the people, shut up in a narrow province between pathless jungles, and an impracticable sea, were in the condition of passengers in a ship without provisions." The failure of the rains and the loss of the crops in this area was greatly aggravated by severe floods from the rivers which followed later in September, 1865, and overwhelmed a thousand square miles of low-lying country, submerging for many days the houses and fields of one and a quarter million of people. Nearly a million people are said to have died in Orissa. Provided adequate communications exist into and throughout a famine area, sound famine policy dictates non-interference with private traders in grain, and Government should refrain from interfering as long as possible.

The Government of Bengal, oblivious of the fact that communications into Orissa were almost non-existent (it has been shown that the forests in the division were inaccessible, Vol. I, p. 322), decided to do nothing. Sir John Lawrence had seen the necessity of importing rice as early as November, 1865, but gave way to the representations of the Local Government. The real position was recognised too late. During the latter part of 1865, and throughout 1866, the measures adopted were inadequate; whilst in the two subsequent years the expenditure was extravagant. But the grave failure which had attended the Orissa famine was an added stimulant to Sir John Lawrence's Government to push on with the construction of public works of various kinds in other provinces. It will be shown how great a part this policy played in the development of forest management during the period here dealt with. There were set-backs. A serious trade depression, more especially in the west, caused by the failure of the Bank of Bombay, reacted on the forest receipts of that Presidency, and made its influence felt further to the north and east. This failure was an outcome of the American Civil War and an abnormal demand for Indian cotton, resulting in wild speculation, in which the management of the Bank participated. The results might well have proved disastrous to the fortunes and progress of the young Forest Department in parts of the country had it not been for the wise and far-sighted statesmanship of the Government of India and Secretary of State. They attributed the decreased receipts of the new department to their rightful causes, and were not to be turned from the path they had adopted by the outcry of interested timber merchants who drew the conclusion that forests managed by a Forestry Department could never pay; and that the old policy of leasing the forests for the supply of timber to the timber merchant should be reverted to.

In agricultural legislation Sir John Lawrence had taken a deep interest in the welfare of the peasantry, and had always been ready to support their rights as against the demands of the greater landholders. He passed a Measure (Act XXVI of 1866) for the protection of under-proprietors and tenants in Oudh; but was warned by the Secretary of State "to take especial care, without sacrificing the just rights of others, to maintain the talookdars of Oudh in that position of consideration and dignity which Lord Canning's Government contemplated conferring on them."

INTRODUCTION OF A FOREST ORGANISATION 7

After Lord Mayo assumed the Governor-Generalship the misgovernment of Alwar State in Rajputana resulted in the transference of the Government to a Council under British supervision. Troubles also took place in the turbulent little States of the Kathiawar Peninsula. These were dealt with judiciously, but were not without their importance on forest administration.

Perhaps the chief act of Lord Mayo in its direct effect on the forest administration was his measure of financial reform. This will be alluded to in a subsequent part of this work. Lord Mayo's three years of office were brought to an untimely end at the Andamans, where he was murdered by a convict in January, 1872. This brief historic survey of the period will, it is believed, assist in an understanding of the lines on which forest administration developed after Brandis' appointment as Inspector-General in 1864.

Cleghorn, as has been described in Volume I, had been engaged during 1862 and 1863 in laying the foundation of systematic forest administration in the Punjab, by examining the forest resources of the Punjab and the North-West Himalaya and reporting on the steps necessary for their management. His services in the Punjab received high commendation from the Lieutenant-Governor, a commendation in which the Governor-General in Council heartily concurred. During 1864 and part of 1865 Cleghorn was associated with Brandis, the two officers being appointed "Commissioners of Forests" to assist the Government of India and Local Governments in the first organisation and further development of a methodical system of forest management. In April, 1866, Brandis went on furlough to Europe, and Cleghorn officiated as Inspector-General of Forests till the latter's return in January, 1867, Cleghorn then reverting to his permanent appointment as Conservator in the Madras Presidency. As has been shown, in a resolution dated January, 1865, the Governor-General had designated Cleghorn as the Founder of Forest Conservancy in India, and in a second resolution in 1867 he received the thanks of the Government of India for his long and successful labours in the cause of Forest Conservancy in India.

The lines upon which Brandis and Cleghorn set about introducing a uniform system of forest organisation throughout India will now be traced.

It became obvious to these officers that little systematic progress could be made in the absence of some recognised law which afforded protection to the forests as a whole and gave the officers of the new department sufficient authority to carry out the prescriptions laid down for their management. This recognition was given effect to by the drafting and promulgation of an Act entitled the Indian Forest Act VII of 1865.

This Act is reproduced here *in extenso*. It is of considerable interest as being the first attempt at Forest Legislation by the British in India.

ACT No. VII of 1865

PASSED BY THE GOVERNOR-GENERAL OF INDIA IN COUNCIL

(Received the assent of the Governor-General on the
24th February, 1865)

An Act to give effect to Rules for the management and
preservation of Government Forests

Whereas it is expedient that Rules having the force of law should be made from time to time for the better management and preservation of forests wherein rights are vested in Her Majesty for the purposes of the Government of India; It is enacted as follows:—

1. In this Act, unless there be something repugnant in the subject or context—

“Government Forests” shall mean such land covered with trees, brushwood or jungle, as shall be declared in accordance with the second Section of this Act to be subject to its provisions.

“Magistrate” shall mean the Chief Officer charged with the Executive administration of a district or place in criminal matters by whatever designation such Officer is called, and shall include any person invested by the Local Government with the powers of a Magistrate or of a subordinate Magistrate as defined in the Code of Criminal Procedure, with a view to the exercise by him of such powers under this Act.

And in every part of British India in which this Act operates, “Local Government” denotes the persons authorised to administer Executive Government in such part, and includes the Chief Commissioner of any part of British India under the immediate administration of the Governor-General of India in Council whenever such Chief Commissioner is authorised by the Governor-General in Council to exercise the powers of a Local Government under this Act.

2. The Governor-General of India in Council within the Provinces under his immediate administration, and the Local Governments within the Territories under their control, may, by notification in

INTRODUCTION OF A FOREST ORGANISATION 9

the Official Gazette, tender subject to the provisions of this Act, such land covered with trees, brushwood, or jungle, as they may define for the purpose by such notification: Provided that such notification shall not abridge or affect any existing rights of individuals or communities.

3. For the management and preservation of any Government Forests or any part thereof in the Territories under their control, the Local Governments may, subject to the confirmation hereinafter mentioned, make Rules in respect of the matters hereinafter declared, and from time to time may, subject to the like confirmation, repeal, alter and amend the same. Such Rules shall not be repugnant to any law in force.

4. Rules made in pursuance of this Act may provide for the following matters:—

First.—The preservation of all growing trees, shrubs and plants, within Government Forests or of certain kinds only—by prohibiting the marking, girdling, felling and lopping thereof, and all kinds of injury thereto; by prohibiting the kindling of fires so as to endanger such trees, shrubs and plants; by prohibiting the collecting and removing of leaves, fruits, grass, wood-oil, resin, wax, honey, elephants' tusks, horns, skins and hides, stones, lime, or any natural produce of such Forests; by prohibiting the ingress into and the passage through such Forests, except on authorised roads and paths; by prohibiting cultivation and the burning of lime and charcoal, and the grazing of cattle within such Forests.

Second.—The regulation of the use of streams and canals passing through or coming from Government Forests or used for the transport of timber or other the produce of such Forests—by prohibiting the closing or blocking up for any purposes whatsoever of streams or canals used or required for the transport of timber or Forest produce; by prohibiting the poisoning of or otherwise interfering with streams and waters in Government Forests in such a manner as to render the water unfit for use; by regulating and restricting the mode by which timber shall be permitted to be floated down rivers flowing through or from Government Forests and removed from the same; by authorising the stoppage of all floating timber at certain Stations on such rivers within or without the limits of Government Forests for the purpose of levying the dues or revenues lawfully payable thereon; by authorising the collecting of all timber adrift on such rivers, and the disposal of the same belonging to the Government.

Third.—The safe custody of timber the produce of Government Forests—by regulating the manner in which timber, being the produce of Government Forests, shall be felled or converted; by prohibiting the converting or cutting into pieces or burning of any timber, or the disposal of such timber by sale or otherwise, by any person not the lawful owner of such timber, or not acting on behalf

Governments may render certain lands subject to the provisions of this Act.

Local Governments may make Rules for management and preservation of Forests, and for regulating the conduct of persons employed on them.

What may be provided for by Rules made in pursuance of this Act.

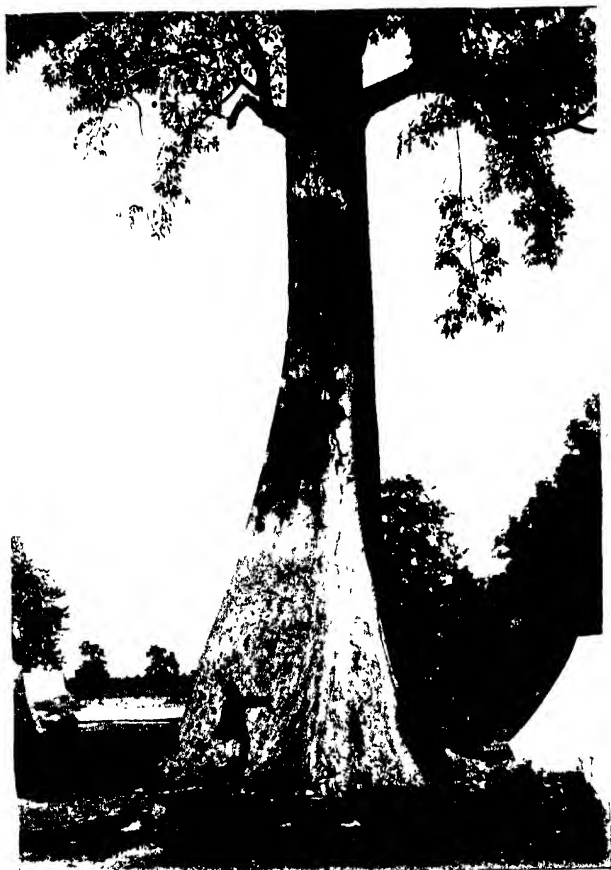
the Governments of Bengal, the North-Western Provinces and the Punjab; and it shall be lawful for the Governors in Council of Madras and Bombay respectively, by notification in the Official Gazette, to extend this Act to the Territories under their respective Governments.

Commence-
ment of
Act. Short
Title.

19. This Act shall come into operation on the first day of May, 1865, and may be cited as "The Government Forests Act, 1865."

Under the Act it will be seen that Local Governments were empowered to draft Local Rules for their respective provinces for the better management and preservation of the forests. The necessity for such forest legislation was borne out by the fact that during the years 1865 and 1866 seven Local Governments and Administrations, Mysore, Coorg, Burma, Central Provinces, Berar (Hyderabad Assigned Districts), Oudh, and Bengal, submitted draft rules for confirmation to the Government of India, whilst the North-West Provinces and Punjab had such rules under consideration. Cleghorn, officiating Inspector-General of Forests, had also drawn up a set of simple rules for the conservancy of the forests of the Native States in Central India who might desire to adopt them. These latter were not connected with Act VII of 1865, but were drafted for the guidance of the native durbars, and "it is satisfactory to notice," says the Governor-General's Minute of January, 1867, "that many of the chiefs are becoming alive to the value of their forests and have of their own accord adopted these rules."

The Rules under the Act deal with the details of Forest Conservancy such as the staff to be employed in the administration of the forests, the procedure to be followed in creating "Reserved Forests" and "Unreserved Forests," their demarcation, the nature of the acts which were prohibited within them and the privileges of the local villagers or ryots within either class of forest. Lists of "reserved" trees were drawn up, the felling of which was prohibited in the forest without previous permission having been accorded, and the procedure was defined for removing unreserved trees, grass, fuel and so forth. Felling in any forest could be stopped by the Forest Officers on adequate cause being shown. The practices so long in force of firing the forests, grazing, shifting cultivation and unauthorised hacking and felling were prohibited in reserved forests unless previous sanction had been obtained. For the felling and removal of timber licenses were to be issued by the



BOMBAY MALABARICUM SHOWING THE DEVELOPMENT OF BUTTRESSES,
N.W. PROVINCES

Photograph by H. Jackson

INTRODUCTION OF A FOREST ORGANISATION 13

Forest Officers, the trees having been previously selected and marked by the Staff, and the localities at which the prescribed duties on the material were to be paid were to be fixed, and the material removed by these routes only. Private individuals were allowed to cut timber on their own lands for their own use, but in case of the reserved species would have to obtain licenses in a similar fashion to timber merchants if they wished to sell it. In areas where the timber was floated from the forests the material would be required to be stopped at the River Revenue Stations, where it would be measured and the duties levied on it. Rules were also prescribed for the collection of all drift timber and its disposal. It was enacted that the Rules could be amended by the authorities when found necessary, and penalties for their breach were enacted under the clauses of the Forest Act VII, which empowered such to be enforced.

The Rules promulgated by the Local Governments and Administrations directly under the Government of India marked a great departure in the first organisation of the forests on sound lines. Although it could not be expected that it would be possible to work them in full detail, at the outset they established in a significant manner the realisation by the Government of India and the Local Governments and Administrations of the value of the forest estate, and the necessity of endeavouring to put a stop, as soon as possible, to the wasteful and extravagant utilisation of the forest resources of the country which had been in force for so long. That many years were to elapse before the organisation proved adequate to the real needs of the country as a whole was due to various causes. In the more backward provinces the more or less uncivilised jungle tribes had to be gradually weaned from views which were the natural outcome of their immemorial usage of the forests, and educated up to a realisation, even if only a dim and hazy one, of the value of the protection it was desired to give to the forests in the interests of the latter and of the people themselves. In the more densely inhabited parts of the country the same education had to be supplied from a different view-point, and here there was an added factor in the opposition experienced from the timber merchants. Generally speaking, throughout the country the district officials themselves, with some notable exceptions, displayed considerable difficulty in grasping the true aims of a forest policy and forest organisation and in recognising that

the interests of the people were involved; that the new departure was not merely a question of the introduction of a new body of specialised officials on to the country-side to manage areas which previously had been under the district officials' exclusive charge. That these ideas were of long standing, having been voiced as far back as 1823 by Sir Thomas Munro, has been already shown in this History, and their gradual disappearance could only be expected as the benefit of the preservation of the forests became apparent. Moreover, progress was retarded in some provinces by the misdirected zeal of Forest Officers themselves, who endeavoured to put the Rules in force with uncompromising rigour amongst a population and under conditions where compulsion was an impossibility; the inevitable consequence being a set-back to the very cause which their enthusiasm was designed to forward.

In Madras the Governor in Council called for an expression of opinion from its revenue officials on the question of introducing the Forest Act VII of 1865 into the Presidency. The Conservator, Cleghorn, who was shortly leaving, wrote (19th October, 1867) that in his opinion, generally speaking, the introduction of the Act would have beneficial results; he also expressed the view that all Forest Officers of the higher grades and of proved temper and judgment should have the powers of a subordinate magistrate. Beddome also agreed that the application of the Act was desirable, as the forest rules under the local system in force could not be legally enforced. Unfortunately Beddome, on succeeding Cleghorn as Conservator, appears to have considerably modified his opinion in a later communication. The majority of the Collectors were strongly opposed to the introduction of the Act into the Presidency, and in this they were supported by the Board of Revenue, who expressed the following opinions in their Proceedings dated 16th April, 1868, No. 2777:—

"The application of the Act is quite unnecessary, inasmuch as the penal code already provides for offences of every description, under the heads of mischief, trespass and theft; and it is highly inexpedient to multiply legislation of a special nature, and especially so, to create offences, by 'rules' which may be varied at the will of the executive.

The Act will not in any way facilitate conservancy, and no forest land can be placed within the scope of it, which is not absolutely the property of Government, free from private rights of

INTRODUCTION OF A FOREST ORGANISATION 15

every kind, for 'Section 2 specially enacts that its application 'shall not abridge or affect any existing rights.'

All the jungles and forests of this Presidency are within village boundaries, and the people residing in or near them, have, from time immemorial, had the right to take leaves for manure, firewood for their own use, and timber for agricultural purposes, to graze their cattle at certain periods.

These rights have been repeatedly recognised by Government, and are now scrupulously respected.

When, therefore, these and other similar existing privileges, as well as the rights of way which necessarily exist through forest tracts are taken into consideration, the operation of the Act in this Presidency will be very limited, and every prosecution under it may be met by the allegation (which the Forest Officers must disprove) that a right previously existed which vitiates the application of the Act.

When the forest is the absolute property of Government, no special Act is necessary to declare it such.

The great difficulty which the Forest Department has to overcome is that of proving the offences which they bring forward; as the magistracy of course refuse to convict without good evidence of the offence having been committed.

In this respect the Act affords no aid, as the Forest Officer will still have to *prove* his charges to the satisfaction of the magistrate, by exactly the same evidence as would be required without the Act.

But while thus useless for good, the Act, in the opinion of the Board, opens a wide and dangerous field for oppression and extortion.

By Section 8 any Forest Officer, even a 'peon on five rupees per mensem, may arrest, without warrant, any person infringing rules under the Act.

It is true that any person so arrested must, under Section 9, be 'forthwith' taken before a magistrate, but this will in this Presidency involve very great hardship, as magistrates are at considerable distances apart, and it is obvious this provision is of itself sufficiently dangerous to condemn the Act.

It will be in the power of the pettiest 'peon' in the Department to harass the people at his own pleasure, and the Board would request the attention of Government specially to the letters of the Collectors of Ganjam, Coimbatore and South Canara, which well illustrate the manner in which the people, in the exercise of their prescriptive rights, would be placed at the mercy of ill-paid and almost uncontrolled officials.

The Forest Officers naturally desire to have ample powers, but the Board would observe that there are other things to be considered besides the value and preservation of timber. The grazing

of cattle in forest tracts is one of the chief grievances, but it is not too much to say that this was the saving of a very large proportion of the cattle of the country, and the preservation of a large amount of land revenue in 1866.

The encroachment of cultivation is another grievance, but in many cases the reclamation of land from a state of nature to that of producing food is an unquestionable advantage.

The fact is that a very large proportion of the so-called 'forests' of this Presidency are, in truth, merely jungles with villages scattered through them; rights of way in all directions, and privileges existing of various kinds; and it is impossible to introduce into such tracts the stringent system of conservancy practicable in countries like Burma (which the framers of the Act doubtless had in view), without exciting much popular discontent, and incurring serious risk of oppression.

It appears to the Board that the present system, considering the short period that has elapsed since Government began to exercise its forest rights, has worked very fairly, and what is now wanted is the demarcation of forest reserves, and the maintenance of suitable establishments.

On the first point it must be remembered that until quite recently, except in the Anaimalais and a few other localities, the people were free to cut what wood they pleased, to graze their cattle, and to exercise common rights without let or hindrance. It is but just, therefore, that the fact of these rights being withdrawn should be made known by proper notification, by demarcation, and by some effectual means of fencing where the forest surrounds a village and its cultivation.

So far as the Board are aware, the Forest Department have not yet done this in any case, and it cannot be expected that the magistracy will convict for mischief and trespass, when there is nothing whatever to show that the forest or jungle is preserved.

With regard to the second point noted above, the establishments are so weak as almost to tempt spoliation of the forests; one or two 'peons' at what is called the outlet of a forest, but is in reality the outlet of a large tract of country, cultivated and populated, is the usual protective force, which can easily be avoided by those who wish to do so, seeing that there is no fencing, and that outlets exist in every direction.

It is not surprising that offences are committed under such circumstances, but the remedy is certainly not to be sought by making arbitrary additions to the Statute Book.

It is said that some judges have refused to recognise offences against the property of Government in forests, but this has no doubt arisen from the offence being laid as breaches of the forest rules, which, like the 'Revenue Hukumnamah,' are merely administrative orders.

INTRODUCTION OF A FOREST ORGANISATION 17

It cannot be that such property is beyond the pale of the law, but if the doubt be as to Government being really the proprietor of any forest, the Act will not solve the difficulty, for Government cannot declare that to be their property which is not clearly their own.

In the opinion of the Board this should be definitely settled, and it is highly desirable that where any forest land is reserved the system of conservancy should be sufficient to meet the end in view, and not, as in so many cases at present, utterly inadequate for the purpose; and specially should the sources of springs and rivers be protected by a careful and complete system of conservancy, which can be done without any necessity for introducing the Act."

With this expression of opinion on the part of the Board of Revenue before him the Governor in Council, Madras, wrote to the Secretary of State (Rev. No. 5, dated 22nd June, 1869), forwarding the papers giving the opinion of the officials consulted and expressing his concurrence with the Board in the following sentences :—

" We have given the papers our most careful consideration, and are of opinion that the introduction of the Forest Act into the Madras Presidency is uncalled for at present, and would be inexpedient.

The tenure of land in Southern India differs vastly from that of those portions of the continent where the Act is said to have been introduced with success. As observed by the Board of Revenue, however applicable such an enactment may prove to the large forests of Burma and other similar localities, it could hardly be introduced into this Presidency, where nearly all the jungles and forests are within village boundaries, and are subject to the prescriptive rights of the villagers, without causing much popular discontent and serious risk of oppression."

It will be observed from the above that the Madras Board of Revenue, in spite of sixty years of forest destruction, had not yet been able to appreciate the fundamental basis of forest conservancy. That if an ignorant population failed to realise that their improvident acts would result in totally destroying forest areas and reducing them to barren lands, thus leaving nothing for their successors, it was, at least, the duty of a Government to take such steps as would remove the danger.

The Proceedings of the Government of Bombay in the

Revenue Department, dated 23rd March, 1869, reproduce a Memorandum by Brandis, Inspector-General of Forests, dated 28th February, 1869, containing suggestions on certain points connected with the management of the forests in the Bombay Presidency. In this Memorandum the following paragraph appears with reference to the introduction of the Forest Act VII of 1865 into the Presidency: "In the matter of forest legislation, I would draw attention to the peculiar difficulties under which a portion, at least, of the Bombay Forests are placed in the matter of protection. I understand that the Government forests are frequently so interlaced with private forest lands that protection is impossible without a system of strict control over all timber, wood and forest produce in transit, whether it is the produce of Government or private lands, or has been imported from forests beyond British territory.

The existing Forest Act (VII of 1865) does not provide for the exercise of such a control. The object in view would, therefore, not be furthered by extension of this Act to Bombay. But a revision of the Act is at present under the consideration of the Government of India, and I would suggest that a Report be made, as soon as practicable, to the Government of India of the circumstances which appear to render necessary the introduction of a special clause. I would also suggest that the question be asked whether it is intended in the revised Act to provide for the control of timber, wood and other forest produce from all forest lands, whether Government, private or situated beyond British territory, while in transit by land or water. Should such a clause not be included in the revised Act, then special legislation for the Bombay Presidency would become necessary."

In a Resolution on Brandis' Memorandum the Governor of Bombay in Council on the subject of the Forest Act wrote: "With regard to the question of forest legislation, a mass of papers containing many valuable suggestions on this important subject have already been laid before Government. The Revenue and Survey Commissioners and the Conservator will be requested to avail themselves of the opportunity for meeting together next 'rains' at Poona to discuss the matter with a view to the preparation of a Bill. As the circumstances of different parts of this Presidency vary so much, it will probably be found necessary to prepare separate rules to meet the special requirements of different localities. It is not

INTRODUCTION OF A FOREST ORGANISATION 19

likely that any one Act for the whole of India would suffice for Bombay, and therefore local legislation will be necessary."

In the Rules under the Forest Act, which have been briefly described above, allusion is made to the fact that the forests in the different Local Governments and Administrations had been placed under the management of a Conservator and Staff of Assistants. In the period here under review, these staffs, with the exception of Bombay, where the scale at first introduced had been too lavish and was subsequently reduced, had been subject to expansion with the extension of organisation work. In enclosures to a letter from the Governor-General of India in Council to the Secretary of State for India, dated 31st January, No. 1 Forests, 1868, we find in Circular No. 2 Forests the following reference to the increase in establishments and the charges incurred under this head for the years 1864-65 to 1866-67 and 1867-68 to 1868-69. This Statement is as follows :—

"The organisation of the department has again required a further expansion of establishments. A comparative Statement of these charges, as incurred for the last few years, is recorded in the following table :—

ABSTRACT OF CHARGES UNDER B 'ESTABLISHMENTS' IN FOREST
DEPARTMENT SINCE 1864-65

GOVERNMENTS AND ADMINISTRATIONS.	ACTUALS.			ESTIMATES.	
	1864-65.	1865-66.	1866-67.	1867-68.	1868-69.
	Rs.	Rs.	Rs.	Rs.	Rs.
Government of India	43,615	10,163	30,680	34,047	33,352
Madras	95,300	1,17,054	1,02,920	1,33,000	1,45,500
Bombay and Sind	2,10,352	2,11,987	2,10,973	2,43,428	2,23,797
Bengal	6,604	16,292	14,881	27,471	54,000
North-Western Provinces	65,740	84,558	83,711	1,00,690	1,08,000
Punjab	84,665	77,968	78,680	1,22,010	1,53,820
Oudh	27,154	19,883	21,571	29,304	29,244
British Burma	86,081	90,327	80,544	1,14,262	1,13,000
Central Provinces	61,946	74,994	81,041	1,10,605	1,15,000
Coorg	4,201	8,654	7,127	9,313	10,000
Total	6,85,658	7,11,880	7,12,128	9,24,130	9,85,713
Mysore	53,018	54,768	53,823	64,759	65,000
Hyderabad	478	8,991	*13,718	12,141	31,500
Total	7,39,154	7,75,639	7,79,669	10,01,030	10,82,213

* There is some uncertainty about this item, as nothing appeared under Working.

It will be observed that the charges under Establishments have increased from 6,85,658 rupees in 1864-65 to 9,85,713 rupees in 1868-69."

This statement furnishes direct evidence, upon which further comment appears unnecessary, of the progress which forest organisation had made in the brief period of a decade, and of the hearty co-operation of the Secretary of State with the Government of India in their determination to assist that

ABSTRACT OF THE PROVINCIAL BUDGET ESTIMATES OF THE FOREST
DEPARTMENT THROUGHOUT INDIA, 1868-69, AS PASSED BY THE
GOVERNMENT OF INDIA, IN THE PUBLIC WORKS DEPARTMENT

GOVERNMENTS AND ADMINISTRATIONS.	RECEIPTS.				CHARGES.			
	Actuals, 1866-67.	Budget Estimate, 1867-68.	Regular Estimate, 1867-68.	Budget Estimate, 1868-69.	Actuals, 1866-67.	Budget Estimate, 1867-68.	Regular Estimate, 1867-68.	Budget Estimate, 1868-69.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Government of India	—	—	—	—	30,680	29,752	34,047	33,352
Madras	3,38,608	4,00,000	4,20,000	4,50,000	2,17,171	2,73,000	2,73,000	3,09,800
Bombay and Sind	8,21,268	14,63,197	14,63,197	9,54,000	6,47,443	9,17,570	9,17,570	6,19,597
Bengal	50,555	1,40,978	73,283	1,50,000	1,04,207	1,21,440	1,37,148	1,44,000
North-West Provinces	5,77,954	6,01,448	5,83,267	6,43,700	3,11,897	4,08,385	3,67,401	4,08,000
Punjab	2,31,470	2,60,570	2,93,590	3,78,400	2,55,630	2,48,650	3,06,080	3,66,520
Oudh	2,01,246	1,29,120	1,29,120	2,00,000	59,572	1,06,089	1,11,824	1,30,164
British Burma	4,24,053	8,69,000	7,60,000	6,07,600	2,85,135	3,48,862	3,48,862	3,61,000
Central Provinces	3,67,095	4,17,907	3,72,253	4,76,000	1,27,858	2,90,924	2,90,924	3,72,500
Coorg	31,934	61,750	61,750	80,100	11,552	19,111	18,913	28,400
Total	30,44,183	43,43,970	40,96,460	40,38,800	20,51,145	27,63,785	28,05,769	27,73,333
Total British Net Revenue	9,93,038	15,80,185	12,90,691	12,65,467	—	—	—	—
Mysore	2,66,020	3,91,460	3,46,600	2,06,000	85,988	1,39,954	1,29,659	1,09,500
Hyderabad	43,574	1,26,000	90,000	90,000	13,718	50,557	46,000	81,500
Net Revenue Rs.	3,09,594 2,09,888	5,17,460 3,26,949	4,36,600 2,60,941	2,96,000 1,05,000	99,706	1,90,511	1,75,659	1,91,000 —

progress by all the means within their power, and at as rapid a rate as the existing conditions in the different parts of the country would permit.

The Budget Estimates for this period, dealt with in the same circular, are equally illuminating. We read in the Resolution on this subject :—

"The Governor-General in Council records with satisfaction the general punctuality with which the Budget Estimates for 1868-69 of the Forest Department have been submitted." In previous years there had been considerable delays in the matter of the submission of these budgets, a delay which with the organisation of

INTRODUCTION OF A FOREST ORGANISATION 21

entirely new staffs and the taking over of new unorganised charges was perhaps to be expected, and in some instances almost unavoidable. The neglect, however, to submit the Budget Estimates to time, avoidable or unavoidable as the case may have been, had called forth strong remonstrances from the Secretary of State and the Government of India, and the above expression of satisfaction on the part of the Governor-General points to the fact that for the time being, at any rate, the difficulties had been surmounted. The Resolution continues :—

“ The several Estimates have been reviewed at length separately, and the figures are brought together in the table opposite for convenience of comparison, and in order to exhibit the aggregate amounts involved.

The total amounts, omitting Mysore and the Berars, are :—

	Receipts.	Charges.	Surplus.
	Rs.	Rs.	Rs.
1863-64, Actuals	30,44,430	—	—
1864-65	35,02,022	18,62,461	16,39,561
1865-66	35,63,382	21,36,387	14,26,995
1866-67 (11 months) . . .	30,44,183	20,51,145	9,93,038
1867-68, Regular Estimate .	40,96,460	28,05,769	12,90,691
1868-69, Budget Estimate .	40,38,800	27,73,333	12,65,467

In the four years ending with 1866-67, the gross revenue, after rising from 30½ lakhs in 1863-64 to 35½ lakhs in 1865-66, again subsided to 30½ lakhs in 1866-67, which year comprised eleven months only. If, for the sake of comparison, allowance for the twelfth month is made, this amount is raised to 33½ lakhs. This is not unfavourable, considering that in two of the most productive Provinces, Bombay and British Burma, the general depression of trade caused a great falling off in forest revenue. The aggregate charges have been annually increasing, and consequently the surplus has diminished from 16 to 12 lakhs. This, however, is a necessary consequence of conservancy management, the fruits of which cannot be reaped immediately, but which will not be wanting, provided means are taken to work the forests in accordance with a rational and well-devised plan of operations.”

It will be possible to show in this History how the confident, almost prophetic, assertion contained in the last few lines was to inevitably follow the introduction of “ a rational and well-devised plan of operations,” carried out by a body of highly trained scientific forest experts.

That the authorities had fully grasped the fact that at the

outset of the introduction of a proper conservation of the forests it would not be always possible to cover the expenditure incurred in any one year or series of years in their management by the revenue obtained from them is well brought out by the correspondence which took place at the period on what was termed "extraordinary expenditure." It originated with a letter from the Secretary to Government, Punjab, to the Government of India, in which it was represented that "in consequence of the former indiscriminate felling of timber in several of the Hill Forests" (*vide* Cleghorn's Reports of the Punjab Himalayan Forests, detailed in Vol. I), "a restriction of felling operations within narrow limits has become necessary, and that on this account, and by reason of the orders of the Government of India to include the expenditure for canal and fuel plantations in the Forest Budget, there is apparently no prospect of the expenditure for some years being covered by the expected income."

On this subject the Governor-General, Sir John Lawrence, in Council addressed the following letter (Revenue—Forests No. 24, dated 23rd November, 1867) to the Secretary of State:—

"We have the honour to forward for the information of Her Majesty's Government copy of our Circular Resolution, containing rules to regulate extraordinary expenditure in the Forest Department. The consideration of this matter was necessitated by a reference from the Punjab Government, relative to the principles which should regulate the relation between income and expenditure of the Forest Department in that province, copy of which we also forward herewith.

The Punjab Government represented that owing to the diminished resources of the Hill Forests, and the heavy charges imposed upon the forests on account of the canal and fuel plantations, there was apparently no prospect of the expenditure for some years being covered by the expected income.

In reply, the Local Government was informed that although, as a rule, the ordinary expenditure on account of the forests must always be covered by the income of the year, yet this rule cannot be held to apply to extraordinary expenditure of the nature of capital outlay that will in the end prove directly remunerative.

This difference between ordinary and extraordinary expenditure having thus been admitted, it appeared necessary

INTRODUCTION OF A FOREST ORGANISATION 23

to lay down certain rules for the more efficient control of the extraordinary expenditure, and to communicate these orders to all Local Governments and minor administrations for their guidance. This is the object of the circular now transmitted."

The orders issued, when the period in the history of forest organisation is considered, marked a considerable appreciation of the position of the forests, but as was perhaps inevitable at the time and with the staff then available, they made no mention of the considerable expenditure which would become necessary on the silvicultural operations necessary to restore the large areas of ruined forests existing in every province which were being taken over by the Department and to the large expenditure which would have to be faced in protection against fire and other dangers. This was an unfortunate omission, as it was to result in an inevitable set-back to future progress; Local Governments for many years subsequently, in their natural wish to obtain a revenue from their forest estates, being unwilling to provide extraordinary expenditure to the extent required for these matters. But, as has been said, the Circular was for the period a valuable one. It laid down the following orders with reference to extraordinary expenditure :—

"With reference to the representation of the Punjab Government, it appears expedient to the Governor-General in Council, to state that there are certain cases in which the administration of forests must, like the Irrigation Department, undertake works of public utility, the outlay on which, within one year, may not always be covered by the revenue of the year. The rule that the forest expenditure shall always be covered by the revenue can, in its very nature, only apply to ordinary expenditure.

It must, of course, be a principle in the spread of forest conservancy, as in the spread of irrigation, not to undertake anything that is not likely in the end to prove remunerative. Unless this is done, the operations will prove to be financially impracticable, if carried out on any large scale. But it would be fatal to progress to apply this principle so as to refer to the income and expenditure within each year. The forest expenditure, like that for irrigation, must be divided into two grand classes: ordinary and extraordinary.

For the ordinary expenditure, it is evidently, at least, necessary not to allow any expenditure beyond the year's

income ; indeed, as a general rule, the expenditure should be far less than the income, if any revenue is to be derived from the forests. But for the extraordinary expenditure, such a rule is inapplicable. For the latter, the same principle should hold good which is applied in the case of irrigation projects. Each proposal for extraordinary expenditure must be regarded as of the nature of capital outlay, and must, in the first instance, be worked out in full detail to show that all the measures have been carefully considered beforehand, and that the result is likely to be ultimately profitable to such a degree as to justify the outlay. When once this has been established, and if the outlay is otherwise proper and convenient, the expenditure should be sanctioned irrespective of the present income of the forest, and subject only to considerations of practical convenience and financial prudence.

Next to improved communication and to irrigation, his Excellency in Council considers that there is nothing which the Government can undertake in the way of physical improvements so advantageous at once to the comfort and well-being of the people, and the progress of the country in civilisation and riches, as the maintenance and improvement of existing forests, and, wherever necessary, the establishment of plantations for timber and fuel ; while, as in the case of irrigation also, there is here not only advantage to the country, but a certain prospect of an ultimate large income to the Government in a way that will not press on the people, but, on the contrary, will aid their resources.

Such being the case, it appears to his Excellency in Council desirable to encourage the Local Governments to bring forward carefully considered schemes likely to be ultimately profitable, and to set them in hand as soon as they are matured, and all needful arrangements made for carrying them out gradually, systematically and economically. In this the tenor of recent despatches from the Secretary of State affords the Government of India full support.

These views were communicated to the Financial Department in May last, and have been generally assented to on further consideration in that Department, on the understanding that a proper distinction between ordinary and extraordinary expenditure will be carefully maintained.

It is probable that there will be no immediate need in any province to exceed the annual income by any considerable amount, and therefore it may not now be necessary to introduce

INTRODUCTION OF A FOREST ORGANISATION 25

a new head of account, 'Forest Charges Extraordinary.' But it appears expedient to frame a few simple rules to guide the local authorities in preparing the projects of such works, the outlay for which may be regarded as capital expenditure.

Expenditure on account of the following three classes of works or undertakings may be regarded as capital or extraordinary expenditure :—

1st. Purchases of land on a large scale for plantations, or the purchase of forests, or the purchase of rights and privileges in Government forests from the inhabitants of the neighbourhood, or from other parties (such outlay would fall under Budget sub-head IV).

2nd. Plantations on a large scale (Budget sub-head VI).

3rd. Works undertaken to facilitate the working of the forests, such as roads, canals for floating timber, and works for the improvement of existing streams, as far as it appears expedient to entrust the execution of such works to the Forest Department (Budget sub-head X).

These appear to be the only classes of outlay involving *bona fide* capital expenditure, which need not necessarily be covered by the income of the same year.

Regarding expenditure under Budget sub-head X (Communications), it was ruled in Standing Order No. 5 of 1867, that items exceeding 5,000 rupees should be entered separately in the Budget Estimate. A similar course should now be pursued with all classes of expenditure mentioned above. Wherever any individual item exceeds 5,000 rupees, it should be entered separately, under its proper sub-head, in the Budget Estimate, and a separate detailed report or estimate should be submitted, explaining the particulars of the work proposed. In the case of roads, canals and other works, which admit of the employment of the Public Works forms of estimate, these should be used, but in all cases these reports on projects should be accompanied by the needful maps and plans, and by a detailed specification of what is proposed to be done.

Such projects should, as far as practicable, be submitted for sanction to the Government of India in anticipation of the Budget Estimates.

These rules will apply to all projects, either for the purchase of forests, or forest rights, or for plantations on a large scale, or for communications individually exceeding 5,000 rupees in one year, whether they create an excess of expenditure over income or not."

the following twenty ports, viz. : Aberdeen, Belfast, Bristol, Cork, Dartmouth, Falmouth, Gloucester, Glasgow, Greenock, Guernsey, Liverpool, London, Milford, Newcastle and Shields, Southampton, Shoreham, Sunderland, Swansea, Torquay and Whitehaven. In some cases the replies seemed to favour Malabar teak. Others only used Burma teak ; some did not understand what the term "girdling" meant, whilst a proportion expressed their inability to furnish any opinion on the matter.

The Government of India had also circularised all Local Governments, asking for the opinions of the local officials, both forest and others.

Brandis based his second Memorandum on a review of the whole of the new information detailed in the Reports forwarded by Local Governments and Administrations and on the opinions of the shipbuilders at home. He commenced by stating, "At the outset, it should be mentioned that the question has been considerably narrowed. The advantages and drawbacks of girdling may now be considered with reference only to teak timber, for the reports from the Central Provinces and the North-West Provinces conclusively show that sal timber when killed by girdling is, in most cases, attacked by insects. In the first Report it was said that girdling was not indicated in the case of coniferous trees in the Himalaya, and as no definite facts bearing upon the effect of girdling on trees of other kinds have been brought forward, it will be sufficient here to discuss the question with reference to teak alone." Brandis reviewed the divergent opinions expressed on the subject by Forest Officers, discussing the question from the point of view of loss of water, oil, extra brittleness and hardness of the timber, and dealt with the question of the season at which felling took place in India and Europe, pointing out that in the latter timber was not necessarily always felled in winter, instancing the Alps, Black Forest and Vosges, where summer felling was the practice, and stated that "a large proportion of the oak timber of France and Southern Europe, used in the navy dockyards of England, is likewise not felled in winter." Summing up, Brandis said, "The practical result, then, of the discussion on seasoning teak timber by girdling appears to be, that it does not appear desirable in the present state of the opinions of Forest Officers and others to introduce this practice where it has not hitherto been employed." On the subject of the



CYPRESS TREES (*CUPRESSUS TORULOSA*) AT NAINI TAL, N.W. PROVINCES

Photograph by Sir S. Eardley Wilmot

INTRODUCTION OF A FOREST ORGANISATION 29

comparative values of Burma and Malabar teak he wrote, "An opinion appears to be prevalent that Burma teak grows on low and marshy soils, and is of rapid growth. This should be corrected; for most part of the Burma teak grows on dry hills, and very little of it is produced on alluvial soil; it never is found on marshy ground. As to the rate of growth, this probably varies in Burma, as in any other country, according to soil, exposition, greater or less steepness of slope and climate. The average growth of the teak in the Nellumbour plantations of Malabar is fully as rapid, if not more so, than the growth of teak in the different plantations in British Burma. There would therefore appear to be other reasons for the difference in quality of the teak timber from these two sources, which further experience may, perhaps, aid us to discover."

Brandis closed his Report with the suggestion that "Forest Officers in this country should endeavour to collect reliable data on the durability of timber in different circumstances, of different kinds, and seasoned by different methods."

The orders contained in the Resolution of the Government of India, dated 22nd October, 1867, sent to the Local Governments and Administrations were as follows :—

"It seems to his Excellency in Council that the data now available appear to point to the following conclusions :—

1st. That the question may now be considered to refer alone to teak timber, as the girdling of sâl appears to be decidedly unadvisable, and for the girdling of other trees no grounds have been brought forward.

2nd. That, under existing circumstances, there seem no grounds to recommend the seasoning of teak timber by girdling in Government forests, where it is not at present practised.

3rd. That in the Government forests of Burma, where alone the practice is existing, it cannot be abandoned, as this would, in most instances, render impracticable the export of timber; but that, in that province also, the felling of green teak might be resorted to as an experiment on a small scale, wherever the timber can be exported by land, on boats or on rafts of seasoned timber.

4th. That the data at present available do not justify a final conclusion on the merits or demerits of this mode of seasoning teak timber, but that further experience and direct experiments are required to complete our knowledge on this subject."

After his appointment as Inspector-General of Forests, Brandis had early recognised the necessity of recruiting the ranks of the superior service with some fully trained officers. The steps he took with this object in view are detailed in the next chapter, but in order to ensure, by a flow of promotion, suitable conditions of service to attract good men, he suggested that the officers of the various provinces and administrations under the Government of India should be placed on one list. This gave rise to the first classification of the superior grades of the Department.

These proposals for the reorganisation of the superior establishments of the Forest Department were approved by the Secretary of State in November, 1868. The following rules were drawn up to have effect from the 1st March, 1869. These rules were destined to remain in force with some modifications for well over thirty years, and therefore merit reproduction here.

“ RULES REGARDING APPOINTMENTS, PROMOTIONS, TRANSFERS, ETC.,
OF OFFICERS OF THE FOREST DEPARTMENT UNDER THE CONTROL
OF THE GOVERNMENT OF INDIA.

I.—The forest establishments under the control of the Government of India will commonly be divided into the subordinate and the controlling establishments. The following rules are applicable to the officers who constitute the controlling establishments, under the several Lieutenant-Governors and Chief Commissioners, but not to those under the Governments of Madras and Bombay.

II.—The officers of the Forest Department will be placed on one general list from 1st March, 1869, and will be divided into classes and grades with salaries as follows :—

	Conservators	Per Mensem Rs.
1st Class	1,600
2nd „	1,400
3rd „	1,200
4th „	1,000
	<i>Deputy Conservators</i>	
1st Grade	900
2nd „	700
3rd „	500
	<i>Assistant Conservators</i>	
1st Grade	450
2nd „	350
3rd „	250

INTRODUCTION OF A FOREST ORGANISATION 31

All of these offices will be open without distinction to Europeans and natives of India, subject to the rules and conditions herein prescribed.

The italics are the writer's. It appears to have been a common impression in the past that the superior ranks of the Department were not open to Indians. The truth is to be found in the fact that owing to the disinclination of Indians for a forest life, the right stamp of man did not present himself for competition with the European applicants. This matter is dealt with in the next chapter.

“ III.—The number of Conservators of each class will be settled from time to time by the Government of India, and the total number of Deputy Conservators and Assistant Conservators, respectively, will be fixed for each Province by the same authority. There will be no fixed proportion between the numbers in the several grades in these last-named classes, which will necessarily vary under the rules for promotions which follow.

IV.—First appointments of officers to the Controlling Establishment of the Forest Department under the Government of India will be made either by the Secretary of State for India, or by the Governor-General in Council.

V.—Persons admitted to be officers of the Forest Department will, as a rule, be appointed as Assistant Conservators, 3rd grade, but the exigencies of the service may demand the occasional first appointment of officers to the higher grades.

VI.—Promotions from one grade to another of Assistant Conservator and of Deputy Conservator will be made by Local Governments, subject to the conditions named in Rules VIII and X ; and under Local Administrations such promotions will be made by the Government of India on their recommendation.

VII.—Promotions to the classes of Deputy Conservator or Conservator will be made by the Government of India, which will generally be guided by the recommendation of the Local Government or Administration, though it reserves to itself the right of selecting any of the existing establishment to fill vacancies in these classes. Promotions from one class of Conservator to another will also be made by the Government of India.

VIII.—No Assistant Conservator, 3rd grade, will be eligible for promotion to Assistant Conservator, 2nd grade—

(1) Until he shall have passed the examination for the first or lower standard laid down in General Order, Military Department, No. 734, dated 9th September, 1864, or a similar examination in the language of the Province in which he may be employed, or in such other language as may be ordered by the Government of India, and shall have been duly reported to be able to read letters and accounts in the native character ; and

(2) Unless he has been duly reported to be competent to hold charge of a forest range or division.

IX.—Assistant Conservators of the 3rd grade, who have not complied with the conditions laid down in Rule VIII, will not, as a rule, be placed in charge of a forest range or division, but will be attached as supernumeraries to an experienced Forest Officer.

X.—Assistant Conservators of other grades than the 3rd, and Deputy Conservators of all grades, will not ordinarily be eligible for promotion to the next higher grade or class till they shall have served, respectively, three years in the lower grade, and unless they shall have passed the examination for the first or lower standard as defined in Rule VIII, or such other examination in the languages, or in surveying, or in other matters, as the Government of India may from time to time prescribe. But length of service, and the passing of these examinations alone, shall not entitle anyone to promotion; and if in any special case it may be considered desirable to grant promotion before the expiry of the three years' service, or to dispense with the examination test, the sanction of the Government of India must be first obtained.

XI.—Appointments of Deputy or Assistant Conservators to officiate as Conservators, or of Assistant Conservators to officiate as Deputy Conservators, or of persons who are not officers of the Forest Department under the Government of India, to officiate in any class or grade, will, in all cases, be made by the Government of India.

XII.—As a rule, all officiating appointments will be made to the lowest grade of Assistant or Deputy Conservator, and to the lowest class of Conservator; and in such cases the pay of the acting officer will be that of the lowest grade or class of the office in which he is acting. There being no fixed number in the different grades of Assistant Conservator and Deputy Conservator, no acting appointments in the higher grades within these classes will be permitted.

XIII.—If in any special case an officiating appointment is made otherwise than to the lowest grade or class of Assistant or Deputy Conservator or Conservator, the pay of the acting officer will be regulated by the ordinary rules regarding acting allowances, or will be specially fixed by the Government of India.

XIV.—To enable the Government of India to select officers for promotion to the rank of Deputy Conservator and Conservator, Local Governments and administrations should submit, from time to time, to the Government of India, the names of any Assistant Conservators or Deputy Conservators whom they may consider deserving of such advancement; and, after a consideration of such recommendations, a selection will be made by the Government of India on the occurrence of vacancies. In the absence of properly

INTRODUCTION OF A FOREST ORGANISATION 33

qualified officers in the higher grades, junior Deputy or Assistant Conservators will be eligible for promotion to the next higher class.

XV.—Local Governments and administrations may recommend to the Government of India the names of any members of the subordinate establishment whom they may consider specially deserving of promotion, or the names of persons who are not officers of the Forest Department, to be brought forward as candidates for the controlling establishment.

XVI.—In cases of misconduct of Forest Officers, Local Governments may reduce Assistant or Deputy Conservators to a lower grade in the same class. Under the local administrations, cases calling for the reduction of officers to a lower grade will be referred to the Government of India for orders. The reduction of Conservators to a lower class, the reduction of deputies to the class of assistants, and the removal of officers from the controlling establishment, or the final removal of Forest Officers from the Department, will rest with the Government of India.

XVII.—The Government of India alone has the power of accepting the resignation of officers of the Forest Department.

XVIII.—Transfers from one Province to another will be made from time to time by the Government of India, as the exigencies of the Service or the merits of the officers concerned may require. In such cases the Government will use its discretion in giving promotion within the established complement, should it be deemed proper.

XIX.—Postings and transfers within a Province will be made by the Local Government or administration.

XX.—Leave of absence may be granted by Local Governments to officers of the Forest Department, under the rules which may be applicable to the branch of the Service to which such officer belongs; but the power of local administrations in this respect is limited to privilege leave, and to urgent cases of medical certificate. All other applications for leave from officers serving under local administrations should be forwarded, with the opinion of the local administration, to the Government of India.

XXI.—All appointments, promotions, transfers, leave of absence, dates of departure on, and return from, leave, etc., will be reported to the Government of India. They will also be notified in the official *Gazette* of the Province, or if there is no local *Gazette*, they will be notified in the *Gazette of India*.

(3) The established number of Conservators will for the present be as follows: 1st Class, 1; 2nd Class, 1; 3rd Class, 2; 4th Class, 3. Total, 7. Being one for each of the provinces named below, viz. Bengal, North-Western Provinces, Punjab, Burma, Oudh, Central Provinces, Mysore and Coorg.

(4) In the Berars, the appointment of a Deputy Conservator only

has been sanctioned ; but during the incumbency of Mr. F. Read, who ranks as a Conservator, no change will be made, and the junior Conservator, Lieutenant Van Someren, will rank as a supernumerary.

The Deputy Conservators will be fourteen in number, distributed as follows :—

North-Western Provinces, 3 ; Punjab, 3 ; Burma, 3 ; Central Provinces, 3 ; Mysore, 1 ; Berars, 1. Total 14.

The proposed number of Assistant Conservators and their distribution are as follows :—

Bengal, 3 ; North-Western Provinces, 6 ; Punjab, 6 ; Burma, 9 ; Central Provinces, 5 ; Oudh, 3 ; Mysore, 2 ; Coorg, 1 ; Berars, 1. Total 36."

The receipts and charges of the Department up to 1867-68 have been already detailed.

The following abstract from the Provincial Budget of the Forest Department for 1870-71 is of interest as showing the position the Department had arrived at, at the end of the period here dealt with :—

"ABSTRACT OF THE PROVINCIAL BUDGET ESTIMATES OF THE FOREST
GOVERNMENT OF INDIA IN THE

GOVERNMENTS.	RECEIPTS.				Conservancy and			
	Actuals, 1868-69.	Budget Estimate, 1869-70.	Regular Estimate, 1869-70.	Budget Estimate, 1870-71.	Actuals, 1868-69.	Budget Estimate, 1869-70.	Regular Estimate, 1869-70.	Budget Estimate, 1870-71.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Government of—								
India . . .	—	—	—	—	—	—	—	—
Madras . . .	3,91,179	4,70,000	4,50,000	4,50,000	1,32,693	1,93,500	1,76,000	1,86,000
Bombay . . .	9,65,697	7,40,000	8,61,663	9,92,000	2,88,112	2,59,000	3,04,801	4,52,000
Sind . . .	2,47,785	2,76,000	2,49,000	2,65,800	99,300	1,16,000	1,12,400	1,07,800
Bengal . . .	2,24,546	2,20,000	1,90,000	2,69,000	95,581	91,000	89,116	1,94,000
North-Western Provinces . .	6,53,389	6,10,000	6,21,000	8,81,000	3,10,303	2,56,000	3,27,000	5,62,000
Punjab . . .	3,45,164	4,25,000	7,11,000	15,79,000	1,93,516	2,23,000	7,08,310	11,76,000
Oudh . . .	1,31,822	1,77,150	1,77,150	1,67,000	59,566	77,200	77,200	66,000
Central Pro- vinces . . .	3,50,536	4,50,000	4,85,000	4,60,000	1,86,925	2,50,000	3,90,000	1,92,000
British Burma	8,16,171	7,30,000	8,00,000	7,45,000	3,22,981	2,59,800	2,59,800	2,90,000
Coorg . . .	74,448	87,550	87,550	79,000	7,175	19,950	19,950	14,000
Total . . .	42,00,737	41,85,700	46,32,363	58,87,800	16,96,132	17,45,450	24,64,577	32,39,800
Total British Net Revenue .	15,97,892	13,67,692	11,23,529	15,20,494	—	—	—	—
Mysore . . .	3,51,476	2,90,500	2,74,200	3,77,000	59,274	56,700	54,750	90,000
Hyderabad . .	84,556	65,000	1,19,010	1,20,000	6,552	38,000	32,807	50,000
Total . . .	4,36,032	3,55,500	3,93,210	4,97,000	65,826	94,700	87,557	1,40,000
Net Revenue Rs.	2,81,976	1,62,864	2,08,328	2,54,000	—	—	—	—

INTRODUCTION OF A FOREST ORGANISATION 35

The following remarks are made on the abstract :—

" The total amounts, omitting Mysore and the Berars, for the last few years, are :—

	Receipts.	Charges.	Surplus.
	Rs.	Rs.	Rs.
1863-64, Actuals . .	30,44,430	—	—
1864-65 „ . .	35,02,022	18,62,461	16,39,561
1865-66 „ . .	35,63,382	21,36,387	14,26,995
1866-67 „ . .	30,44,183	20,51,145	9,93,038
1867-68 „ . .	33,15,884	22,44,564	10,71,320
1868-69 „ . .	42,00,737	26,02,845	15,97,888
1869-70, Regular Estimate	46,72,363	35,08,834	11,23,529
1870-71, Budget . .	59,61,800	44,51,386	15,10,414

A comparison of these figures with those given in the orders on the Forest Budgets for the current year shows a

ARTMENT THROUGHOUT INDIA FOR 1870-71, AS PASSED BY THE
LIC WORKS DEPARTMENT

[illegible]

satisfactory correspondence between estimates and actual results :—

	Budget Estimate.	Regular Estimate.	Actuals.
1868-69	Rs.	Rs.	Rs.
Receipts . . .	40,38,800	39,98,281	42,00,737
Charges . . .	27,73,333	26,73,977	26,02,845

The financial results of forest operations in this country are affected to a great extent by the rainfall of the year, by the greater or less unhealthiness of the seasons, and lastly, by the fluctuations in the demand for, and price of, timber and other forest produce. Yet, upon the whole, the financial results of the Forest Department have, during the last few years, been fairly in accordance with the Estimates, and his Excellency in Council accepts this as a satisfactory proof of the care bestowed in most provinces upon the preparation of the Forest Budgets.

In the Estimates now sanctioned for the current and next year, it has been necessary to provide for extended operations undertaken to supply timber and fuel for the construction of railways from the forests under the control of the Department in the Punjab and the North-Western Provinces. The success of these operations cannot at this time be accurately estimated, but it is certain that they will largely affect both the income and charges of the Department. It is possible that the actuals of the current and of next year may turn out somewhat different from the Estimates. Making full allowance for some uncertainty in this respect, it is clear that, upon the whole, the revenue of the Forest Department shows a steady and satisfactory increase, having risen from £304,000 in 1863-64 to £420,000 in 1868-69, and being expected to rise to £596,000 in 1870-71. Of the increases estimated for next year, about £100,000 are on account of the extended operations alluded to. A large portion of the additional supplies of wood and timber will be procured from forests in foreign territory, through the agency of the Forest Department, but a portion will come from forests in British territory; and though, to a certain extent, the supplies of future years will necessarily be anticipated to meet the present demand, still his Excellency in Council trusts that sufficient precautions have been taken

INTRODUCTION OF A FOREST ORGANISATION 37

to guard against any deterioration by overtaxing the productive powers of the forests. Without these extraordinary operations, the normal forest revenue in British India for 1870-71 might probably be estimated at £500,000.

On the other hand, the charges have risen in a much greater proportion. They were £186,000 in 1864-65, £260,000 in 1868-69, and are expected to be £445,000 in 1870-71. Of the last-named sum £100,000, or the same amount as under Receipts, has been entered on account of the operations in connection with the construction of the State railways, so that the normal charges of 1870-71 may be estimated at about £345,000.

The expenditure of forest administration is divisible into three great classes: charges for establishments, for the working of the forests, and for works of improvement, such as the demarcation of the forests, planting operations, roads, the opening out of streams, and the like.

The charges for improving the forests have, his Excellency in Council believes, increased considerably of late years, and all operations which serve to increase the productiveness of the forests should everywhere be encouraged, as far as the outlay is justified on financial grounds. The charges for working the forests are necessary wherever it is found expedient to work them on Government account, and the charges for establishments are unavoidable to secure the protection and proper management of the State forest domains.

Nevertheless, his Excellency in Council feels assured that much still remains to be done before the charges of the Forest Department may be said to have been reduced to the lowest figure compatible with efficiency. If the percentage of charges on receipts is considered in the different provinces, it becomes evident that in some the charges are disproportionately high, whereas in others the proportion between receipts and charges is more satisfactory. Thus, in the Madras Presidency, the charges in 1868-69 amounted to 69 per cent on the receipts; in the Central Provinces to 84 per cent and in the Punjab to 90 per cent; whereas in Bombay, Sind, Bengal and Burma the expenditure amounted to between 50 and 60 per cent of the income, and in Coorg only to 22 per cent.

It is true that there are special circumstances in some provinces which appear to a certain extent to account for the high proportion of charges. Thus, in the Punjab and the Central Provinces, it is admitted that the forests which are

most accessible and easily worked are exhausted, or have, at least, been greatly overworked, so that a small surplus revenue only can at the present time be realised. Nevertheless, it seems probable, that in those provinces where the charges are high as compared with the receipts, something may be done to decrease them, and this subject is recommended to the earnest consideration of all Governments and administrations, and of all Forest Officers.

The establishment charges in the Forest Department will demand the special attention of all Governments and administrations. The percentage on receipts of the establishment charges has been heaviest in Madras, 35 per cent ; in the Punjab, 34 per cent ; and the Central Provinces, 31 per cent."

In drawing attention to differences in the cost of establishments in the different provinces the Government of India wrote :—

"It is evident, from the figures here put together, that there is great inequality in the different classes of establishment charges in the different provinces, and there seems at first sight to be room for greater economy in several provinces. It would be most unwise to propose any retrenchments which would have the effect of limiting in any way the operations of the Forest Department, or of arresting its progress. It is, in the opinion of his Excellency the Governor-General in Council, essential, for the future well-being of this country and its inhabitants, that the administration of the public forests and woodlands should be placed upon a satisfactory footing. And it seems equally clear that any relaxation of our efforts in this direction at the present time would only increase the difficulties of hereafter attaining this object. Nevertheless, it is necessary that the administration of the public forests should be so conducted as to yield the largest possible amount of revenue, compatible with a due regard for the maintenance and improvement of these important public domains."

A most interesting Report on the Forests of the Andaman Islands was drawn up by Mr. S. Kurz, Curator of the Herbarium of the Royal Botanic Gardens, Calcutta, as a result of a visit in 1866. Kurz was deputed to undertake this work by the Superintendent of the Gardens, Dr. Anderson, at the

INTRODUCTION OF A FOREST ORGANISATION 39

instance of the Government of India. The Report is lengthy and full of interesting details on the subject of the forests, which were quite unknown at the time.

Kurz summarises his observations on the forests as follows :—

“ Important to Preserve the Andamanese Forests.—It is, however, of the highest importance to preserve the forests on the Andamans.

The whole amount of water and moisture is depending upon the presence of large forests. The scarcity of water on these islands makes it necessary that every precaution should be taken to prevent more jungle being cleared than is absolutely necessary.

Those higher ranges which traverse the eastern parts of South Andaman, on which are the sources of several of the larger creeks, should be spared as much as possible, particularly as their slopes are too steep to undertake any culture on them advantageously.

I recommend also strongly the reading of Mr. Dalzell's important Report on the influence of forests in the records of the Bombay Government, No. 76 (new series), to all officers who are employed on the Andamans in clearing lands.

Unhealthiness of Level Lands likely to be alleged Inadmissible.—An opinion prevails that the level lands, when cleared, are unhealthy. This operates as a prominent obstacle to all agri-horticultural undertakings on these islands. It is no wonder, therefore, to see the steepest slopes of the hills cleared, and cultivation begun on the highest summits. Meanwhile, the fertile valleys or level lands are covered by dense jungles, or made inaccessible by borders of mangrove swamps.

The consequence is the great dependence upon importation for food and the great poverty of the so-called self-supporters, who are confined to lands situated most unfavourably.

We all know that clearances of virgin forests (also on the elevated spots) act most unfavourably upon the health of man during the first years, but this unhealthiness is lessened where clearings are effected by burning down the jungles.

Wasteful as this may appear at first sight, it is the only secure means to procure larger tracts of cultivable lands. It saves lives and time.

After sufficient cultivation has taken place, this system may, of course, be abandoned.

The girdling of all the trees growing on a chosen spot is

more easily executed ; and, after they have been killed, the more valuable timber might be removed for use, the remainder being burnt down would thus give a natural manure to the soil, so much wanted in the Andamans."

Commenting upon the Report, the Secretary of State wrote (R.F. No. 20, 19th May, 1870), "With respect to the concluding paragraphs of the Report on the forests, it is clearly of the greatest importance to preserve, for the very important object named, the existing forests, especially along the higher ranges of the hills. And it would also seem that the timber which he calls kuppalee and bullet wood (*Mimusops littoralis*), may be advantageously made use of for their superior quality and their accessibility. Orders should be issued to the superintendent, enjoining the preservation of the forests, and calling attention to these two kinds of timber mentioned by Mr. S. Kurz."

At the end of the period here considered the position of the Inspector-General of Forests, *vis-à-vis* the Conservators in the different provinces, was regularised by the Government of India. The Secretary of State had several times suggested that this officer should be placed in a position in which he could exercise a more efficient supervision and control over the administration of the forests in the different provinces. During a visit Brandis paid to Bombay he had asked specially that he might be allowed to correspond directly with the Conservator in respect to it. This permission was accorded by Bombay. The Governor-General now notified the Secretary of State (R.F. 27, dated 18th November, 1870), that they had decided to modify the rules for the management of forest business which had been approved by the Secretary of State in his Despatch, No. 16, dated 9th June, 1864. The Government of India were unwilling to diminish the authority and responsibility of the Local Governments and minor administrations in this matter. They had not, therefore, invested the Inspector-General of Forests with any executive authority, nor had they taken any steps towards amalgamating the administration of the Government forests in the different provinces in the Department. They had accorded, however, to the Inspector-General of Forests full power to correspond officially and directly with the Conservators of Forests in all provinces on all subjects relating to forest administration, and they proposed to extend this measure to the Conservators

INTRODUCTION OF A FOREST ORGANISATION 41

in the subordinate presidencies, unless the Government of Madras and Bombay should have any weighty objections to offer to this arrangement.

This was a great step in advance, as it was obviously impossible for the Inspector-General to keep himself *au fait* as to what was taking place in purely forest administration and conservancy in the different provinces unless he was permitted to correspond direct and freely with the Conservators. The Secretary of State cordially endorsed the action taken, adding, however, the perhaps somewhat unnecessary caution, "Your Inspector-General will, I have no doubt, be careful not to call for unnecessary Reports, which would increase inconveniently the labours of Conservators and their establishments."

As will be shown later, under the different provinces, considerable attention was given to the formation of plantations at this time, and exotics of various kinds were being introduced, some with very little chance of yielding results, such as, e.g. *Pinus Maritima* and the European larch. The Secretary of State had sent out consignments of seed of both species at different times. The larch was reported as a total failure in the Himalaya in the Governor-General's letter of 7th June, 1869. Various mischances occurred to the first consignment in which the Reporter of Economic Products was apparently consulted as to distances of sowing. But seed was sown in the Sikkim Division in Bengal, in the Kumaun and Meerut Divisions of the North-West Provinces, and in the Punjab Himalaya. The few plants which germinated died almost at once. Brandis apparently was not very hopeful of this tree succeeding in the Himalaya.

CHAPTER II

THE TRAINING OF FOREST PROBATIONERS FOR INDIAN SERVICE

THE INITIATION OF CONTINENTAL TRAINING BY BRANDIS

IT will not be surprising that Brandis should have early recognised that it would be necessary to obtain the assistance of some fully qualified and scientifically trained officers to help him in the administration and conservation of the Indian forests if the operations carried out were to proceed further than mere demarcation of the forests and the felling and extraction of the timber and other produce. For the higher branches of forestry work he could not solely rely on an untrained staff, however zealous and receptive of new ideas the more able members of this staff might (and did) prove. Accordingly, whilst on furlough in July, 1865, in an interview with the Secretary of State, Brandis put forward his opinion, that it would now be necessary to engage one or two competent persons from the Government Officers in Germany or France to be placed in charge of some of the more important forest divisions in India. The Secretary of State declined to initiate any measures of this description that had not been previously considered and recommended by the Government of India. Brandis accordingly addressed the Government of India on this subject, intimating that he had sent separate memoranda to the Heads of the Administrations in the Punjab, N.W. Provinces, Central Provinces and Burma. He recommended that one trained officer, recruited in Germany or France, should be sent out to each of these provinces, to be placed in charge of the most important divisions as soon as they had made themselves acquainted with the language, country, people and the forests and their method of management. "For the districts under their charge," wrote Brandis, "they would arrange methodical working plans, dividing each forest into such blocks and compartments as the working plans would require; they would carry on the operations of

fellings and thinning as well as planting and improving the forests where necessary and practicable. Where requisite, the means of timber transport would be improved, and the administration of their districts would be placed on a satisfactory footing." He continued: "In selecting such persons, attention should particularly be paid to scientific requirements, specially in natural sciences, and they should be competent to survey a forest, and to plan and build forest roads. Although climate and vegetation in India are different, yet the fundamental principles of forest management are the same everywhere, and persons whose practical experience is supplemented by a scientific education will be able to apply these principles in the forests of another country." In these few sentences was laid down the principle under which the senior grades of the Forest Department in India were recruited and built up, during the succeeding sixty years, into the body of scientific experts which have brought into being the great and valuable Forest Estate at present in existence in India.

These trained men would also, Brandis pointed out, be of great use to the Conservators, who had had no special scientific forest education, in introducing systematic management into their charges, and their services might also be made available for the training of the other Forest Officers and native subordinates in the provinces to which they were posted—suggestions which were to bear fruit in the future. It was scarcely necessary to insist on the importance, he said, of bringing into the Service fully trained men, since "in Germany or in France and elsewhere in Europe, no Government or other large forest proprietor considers it prudent to employ agents in the administration of their forests who have not received a careful training under experienced Forest Officers in the forest schools and colleges." He suggested the minimum pay at which these officers should be entertained as Rs.500 per mensem.

In their Despatch to the Secretary of State (Revenue—Forests, No. 10, dated 25th June, 1866) the Government of India highly approved of Brandis' suggestion, and stated that the Lieutenant-Governor of the Punjab and the Chief Commissioners of the Central Provinces and Burma were strongly impressed with the advantages to be derived from carrying out the proposal; the N.W. Provinces had as yet expressed no opinion in the matter. The Punjab Government, in advocating the measure, considered it "most desirable, not only with reference to the general advantages to be anticipated from the

services of an officer trained to this particular branch of knowledge, but more especially with reference to the exhausted state of the Deodar Forests upon the Ravi and Chenab Rivers, and to the prospect of its soon becoming absolutely necessary to resort to planting, to secure for our successors a supply of 'Deodar and other valuable timber.' The Lieutenant-Governor of the Punjab was accordingly prepared to appoint such a trained officer to the charge of the Jhelum Forest Division, the formation of which the Secretary of State had been already asked to sanction and to which he subsequently gave his approval. It was intimated that a vacancy would shortly occur in Burma.

On receipt of this Despatch the Secretary of State authorised Brandis to select two gentlemen, trained in forest management, from Germany or France, on Rs.500 per mensem (the Government of India had cut the salary to Rs.400, but Brandis said he could not obtain the men for this sum, and the Secretary of State supported him), and one Forester from Scotland on Rs.200 who had been applied for by the Central Provinces. This authorisation was communicated to the Government of India in Secretary of State's Despatch, Revenue, No. 54, dated 14th September, 1866.

For the two posts in the superior grades Brandis selected two young German Forest Officers, Messrs W. Schlich (now Sir William Schlich, K.C.I.E., who was to have a brilliant career both in India and at home) and B. Ribbentrop (subsequently Inspector-General of Forests, 1884-1900, and created C.I.E.). Messrs. Schlich and Ribbentrop arrived at Calcutta on 16th February, 1867, and, under the designation of "Special Assistant Conservators" were posted, the former on Brandis' advice to Burma and the latter to the Punjab, where he was employed in the newly formed Jhelum Division. The third officer, the practical Forester from Scotland, Mr. W. L. Grahame, selected at Brandis' request by Professor Balfour, Professor of Botany at the University of Edinburgh and Director of the Royal Botanic Garden, Edinburgh, arrived at Bombay in January, 1867, and was posted to the Central Provinces to be attached to one of the divisions where the formation of teak plantations was desirable. This appointment was made in answer to the Chief Commissioner's (Mr. Temple) wish that two such Foresters should be sent out to the Central Provinces. Mr. Davidson, the other Forester appointed, had arrived during the previous year. With the

intimate knowledge of administrative and executive work he had acquired in Burma, for in the absence of all scientific knowledge of forestry he had to carry out the executive duties of the Divisional Forest Officer for several years, Brandis was not likely to remain content with having secured the services of two trained men in the Department. He had been considering the question of recruiting the superior grades of the Department with trained men on a far wider basis. He had visualised the needs of the future and realised that if the conservancy of the forests was to be something more than a mere name it would be essential to secure an annual recruitment of trained men in order to bring into being a service of scientifically trained officers at as early a date as possible ; and to provide that facilities for training should be offered to men already in the Department amongst those who had shown ability and capacity for profiting by such training.

Brandis' further proposals on this matter of education were divided into three heads : (1) The provision of facilities for studying forestry in Europe for officers already in the Forest Department in India, none of whom had received any scientific training in Forestry. (2) The immediate selection by him whilst on furlough of five young men in Europe as, what are now termed, forest probationers, for whose training on the Continent he would make arrangements before he returned to India. (3) A general scheme for permanently improving the administration of the Forest Department of India by sending out trained men from Europe.

Brandis' proposals on these heads appear to be as suggestive and valuable at this juncture, when it is held by some that a scientific forestry training could be as efficiently given to the Indian probationer in India as in Europe, as they were at the time he penned them.

(1) *Facilities for studying Forestry by officers of the Department whilst on furlough.* Brandis' suggestions were :—

“ I beg to suggest that Forest Officers who proceed to Europe on leave or furlough be recommended to go through a regular course of training in forestry, and to obtain certificates of their having done so. The extent of this training would necessarily vary according to the length of their leave ; but the following arrangement might be recommended :—

1st. One month with an approved wood manager in Scotland

during the time when most planting work is going on. The best time of the year would be February and March.

2nd. Five or six months, between April and November, with an approved Forest Officer on the Continent, either in France or in Germany.

The certificate to be granted by the instructors might, with a short account by the officers themselves of the time thus spent under training, be submitted by them to the India Office, and thence be transmitted to the Government of India, to be registered by the Government under which the officers are serving. No promise could, of course, be given to the holders of such certificates, although it seems not unreasonable to suppose that, in case of promotion, the special training here recommended might in some cases be considered an advantage." After dealing with the fees which it would be necessary to pay to the instructors selected (France it may be stated refused to allow their officers to accept any fees, stating that they were only too glad to give all possible assistance out of friendship for Britain), Brandis continued: "I may mention that two Forest Officers from Burma, Captain W. J. Seaton, M.S.C., and Lieutenant W. Stenhouse, M.N.I., now on sick leave in Europe, have at my suggestion decided to undergo a course of training similar to that here proposed, without knowing whether the certificates to be obtained will be of any value to them in India. I would respectfully suggest that, should my present proposal be accepted, any fees paid by these officers should be refunded to them.

I wish here to guard against a possible misconception. Forest Officers on leave in Europe should not, as a rule, be recommended to spend their time in travelling about the forests of different countries, imagining to learn forestry by such journeys and an occasional intercourse with Forest Officers. Such journeys are useful for those who are already familiar with the practice and science of forestry in Europe. For all others, a prolonged sojourn with experienced Forest Officers in one or two forest districts will be required to obtain an insight into the general system of forest management that may be turned to useful account in their future career in India.

It may also be necessary to explain why I have proposed a longer time to be devoted to the forests on the Continent than to those in Scotland. On the Continent of Europe, especially in Germany and France, the forests are more extensive, and their administration is entrusted to large departments with

numerous officers of different grades, who have all received a thorough practical and scientific education. In those countries forestry is an important profession, which is followed by young men of the best families, who have a good career to look forward to in the administration, not only of the State forests, but also of those belonging to communes and other public bodies, and of private proprietors.

The State forests of France alone cover an area of 2,706,000 acres, with a gross revenue of 1,740,600 francs, upon which the charges amount to 494,320 francs ; those of Bavaria cover 1,962,000 acres ; and those of Prussia, before the late war, 5,075,000 acres. Compared with these, the woodlands and plantations in England and Scotland are on a much smaller scale, and the education of foresters is not of that high character found in Germany and France.

Again, there are important differences in the general system of management ; and upon the whole it may be said that the system which should be followed in many provinces of India approaches more to the method which has gradually developed itself in Germany and France, and which in those countries has been brought to a high state of perfection. Without entering into details, which could not be exhausted in this paper, I may state that, on the Continent of Europe, natural reproduction of the forest is the rule, not of coppice woods only, but also of high timber forest. The main point looked to in the management of a high timber forest in those countries is so to arrange the cutting and felling as to secure the ground being covered with a young crop of self-sown trees before the old crop is entirely removed. This requires a careful and methodical management. In Scotland and England, with the exception of coppice woods, and a limited extent of natural forest of Scotch fir in the Highlands (Strathspey), the system generally followed is to cut down the mature crop and to plant.

In a large portion of the Indian forests, natural reproduction will have to be relied upon for the maintenance of the forest, planting operations being carried on, as in France and Germany, where the old forest has disappeared or has been injured so as to give no hope of a satisfactory natural reproduction. Under similar circumstances, and on barren wastes, planting operations are carried on in Germany and France with great skill, and on a very large scale, and with great economy. Upon the whole, an intimate acquaintance with the system and practice of forestry in Germany and France is,

in my opinion, a matter of the first importance for the successful management of a large portion of the forests in India.

I may mention that, to enable me to form correct views of the value of training in this branch in England and Scotland, as compared with Germany and France, I have, after spending the first year of my leave in visiting a large extent of forests in the countries last named, devoted the last month and a half to visits at several of the Crown forests in England, and a large number of estates with woods and plantations in England and Scotland."

These expressions of opinion by the man who has been unquestionably recognised as having created the Indian Forest Department remain as true, in fundamentals, to-day as they were when he wrote them in September, 1866.

The suggestion was accepted by both the Government of India and the Secretary of State, and Brandis made arrangements with Monsieur Laydeker in France and with the German authorities as to the instruction which would be given to the Indian Forest Officers on furlough and the localities at which it would be given (Secretary of State Revenue (Forests), No. 8, dated 28th February, 1867).

In May, 1867, at the earnest recommendation of the Director-General of Forests in France, a circular was issued by the Government of India to all Local Governments and Administrations asking that no Forest Officer should be recommended for studying forestry in France unless he possessed a sufficient colloquial knowledge of French to enable him to profit by his visit. In the event of officers not possessing the knowledge they were advised to go first to Nancy where they would find facilities for studying the language and at the same time of making themselves acquainted with the work in the neighbouring forests.

(2) *The immediate selection of five gentlemen in Europe to be trained as Indian Forest Probationers.*—The recruitment for the upper ranks of the Department was at this period in the life of the infant Department practically restricted to India, and, as will be evident from Brandis' subjoined remarks, was in several different hands:—

"The forest appointments for the minor administrations are in the gift of the Governor-General; of the Governors of Bombay and Madras for these Presidencies; and of the Lieutenant-Governors of Bengal, the Punjab, and the North-Western, for these last-named provinces; the remarks and

proposals of this letter, however, do not, I beg to state, refer to either Madras or Bombay.

Under these circumstances, anything like a competitive examination in England for forest appointments is out of the question. But something might be done towards securing the services of young men with special training by following the plan which I now beg most respectfully to suggest.

It might be understood that, after a certain date, say two years hence, the Governor-General would give preference to such candidates who would furnish satisfactory proof of their having passed through a regular course of training in forestry and land surveying; and of their having devoted some time to the study of botany and other natural sciences. The three Lieutenant-Governors might, perhaps, be recommended to adopt a similar course in case of new appointments; and should the plan succeed, the Governors of Madras and Bombay might possibly hereafter avail themselves of the same source to obtain trained men for the Forest Department. Thus a fair opening might be held out to young men of good family connections, who had passed through the course of training here recommended, in the service in the forests in India. Illusions, however, regarding the chances of promotion should be guarded against; for, under existing circumstances, with six distinct Forest Departments in the different provinces of India, the chances of promotion for a young man who enters one of them are not very satisfactory.

Nor should I have ventured to make the present proposals, had it not been for numerous enquiries made to me regarding forest appointments in India, which have led me to believe that, even under present circumstances, suitable candidates will come forward should the plan here suggested be adopted.

The following is the course of study and practical training which I would propose. As here sketched, it would occupy the best part of three years:—

1st. A course of lectures, either at the Edinburgh University, or at the London University College, on botany, chemistry, geology, natural philosophy and zoology. A summer and winter term would, I believe, suffice for attending these lectures; but a second winter term should be added for repetitions.

2nd. A practical and theoretical course with a competent land surveyor.

3rd. Two months with an approved Forester or wood manager in Scotland.

4th. One year with an approved Forest Officer, either in Germany or in France.

Should such appear desirable, I would offer to make preliminary arrangements with an experienced Forester in Scotland, and with Forest Officers on the Continent to receive young men for training. I would arrange the rate of fees to be paid, and I would endeavour to obtain the concurrence to this arrangement of the chief Forest Officers of the State to which the officers selected as instructors belong. I would also arrange for changes to be reported to the India Office. As these arrangements could not conveniently be made by letter from India, I have taken it upon myself to submit a copy of this letter to Her Majesty's Secretary of State for India, soliciting authority to make the preliminary arrangements in question before my departure for India."

In a subsequent letter, dated 6th October, 1866, Brandis submitted reconsidered proposals on this matter, having discussed the question with Dr. J. D. Hooker, the Director of the Royal Botanic Gardens, Kew, and other men of eminence. His new proposal was that five young men should be selected at once and sent for training in one of the Continental Schools where a scientific curriculum was in force. In dealing with this new plan Brandis commenced by giving a detailed description of the curricula and plan of training German and French Forest Officers at certain Forest schools—in the Bavarian Forest School at Aschaffenburg-on-the-Main and at the French Forest School at Nancy—with the cost of the period of instruction, which amounted to two and a half years. If the proposals were accepted the applicants for the five posts should not be below eighteen or above twenty-two years of age, and should have a knowledge of mathematics, elementary natural philosophy (physics) and chemistry and a good colloquial knowledge of French or German, and facility to read and translate works in these languages, in addition to proof of a fair classical education and testimonials to character. Candidates should pass a stiff medical board and, says Brandis, "It may, I suppose, be assumed that none would apply who cannot ride or swim." Why Brandis attached importance to swimming does not appear from the records. Those of the candidates selected who knew French only would be sent to Nancy, the others to Germany. He suggested that each selected probationer should be allowed an annual sum of

sixty pounds, provided his progress was satisfactory, towards defraying the expenses connected with his training. On the question of salary to be offered to the trained probationers Brandis wrote as follows :—

“ The next question is, What salary should be offered to induce good men to go through the training here described? Forest Officers in India frequently live isolated, far from immediate control of their superior officers; they require tact, consideration and sound judgment in their constant, and often difficult, dealings with the natives of the country. Moreover, the fatigue and exposure which the work necessarily entails, are great, and the malaria in most of the forests is an undeniable fact. We require, therefore, pre-eminently picked men, of a high moral character, a good constitution, even temper, and superior abilities; and it may be found, as a rule, advantageous to give preference, *cæteris paribus*, to young men of good family connections.

Under these circumstances I fear that it would be necessary to offer as high a salary as £300 per annum, to commence on the day of their landing in India. They would become entitled to the rights and privileges of other Forest Officers in the Uncovenanted Service as regards travelling allowances, leave and pension rules and promotion. But to ensure their devoting themselves with zeal to the study of native languages, a provision should be made that no rise of their pay on account of promotion would take place previous to their passing an examination in one of the languages, as prescribed by the Government under which they were serving.

It must, however, not be forgotten that, under the existing organisation, great hopes of promotion cannot be held out to these candidates. Should this experiment succeed, so as to induce Government to send out annually a number of men trained in a similar manner, the question of uniting the whole of the forest appointments, those of the Madras and Bombay Presidencies excepted, into one general list for promotion, would then have to be considered. This measure might make it possible to reduce the commencing salary, and still to secure the services of better men.

Another obstacle against the services of good men being obtained by the plan here suggested will be found in the fact that, at the present time, a number of young men go out to India on the chance of obtaining appointments in the

Uncovenanted Service of the police, the forests and other departments. Instances are not rare of such men obtaining, without previous special training, appointments in India worth £300 per annum, and more. Under these circumstances candidates for forest appointments, who have devoted nearly three years to a special training, may find themselves when joining their Department in India at a disadvantage as compared with others who gained time by going out to India without such training. This disadvantage can only be removed by making special training compulsory for forest appointments."

Brandis then developed his reasons for having proposed that the whole training should take place out of Great Britain.

"I suppose I may assume as granted that, in Germany and France, forest administration is carried on on a much larger scale than in this country. Forestry there is a calling followed by young men of the best families, and the forests are managed according to a methodical system based on scientific principles.

A short time might, indeed, with advantage, be spent with an experienced wood manager in Scotland, and candidates for appointments in India should be encouraged to do this, and to obtain a certificate of their having done so. But the main part of the practical training, and the study of forestry as a science, must be done abroad. This being the case, it seems more convenient that candidates should go through the whole of their studies at one place, where the teaching is specially arranged to meet the requirements of Forest Officers.

Otherwise it would be possible to study the natural sciences, mathematics, the elements of surveying and engineering, in this country either with private tutors or at one of the Universities (Edinburgh, Glasgow, Dublin, University College, London), or at the School of Mines in Jermyn Street. But for forestry, the candidates would require to go to Germany or France, and it would, under this arrangement, be difficult to bring the whole course of studies and practical training within less than three years.

In conclusion, I deem it important to meet two objections to the plan here set forth. The first objection is, that the science and practice of forestry, as it has developed itself in Germany and France, is not applicable to India, the trees not being the same, and the climate being altogether different.

To this I reply, that the fundamental laws of vegetation, that is, of reproduction by seed or from stools, of nutrition, growth, disease and death, are the same in all climes and for all species of trees, which are of importance to the Forester ; and that the plain fundamental principle of forestry, not to cut more within one year on a given area than is produced within the same time, either by natural growth or by planting, holds good wherever forest conservancy is attempted. Though the elaborate working plans of the French and German forests cannot at present be imitated in India, yet the study of a system carefully devised and successfully carried out in Europe will furnish the thinking Forester with useful suggestions for applying the principles of forestry in India.

The second objection is, that in the same manner as there are separate forest schools in the different countries of Europe, so a forest school should be established in India. To this I reply that it would be exceedingly difficult and expensive to secure for India the services of competent professors of forestry ; that for many years to come the candidates for the higher branches of the Service must be drawn from England ; and that their training in India would entail great expense without any corresponding advantage ; finally, that the number of junior appointments to be filled up annually is not sufficient to warrant the establishment of a separate forest school."

These proposals received hearty commendation and support from the Secretary of State and Government of India, as is shown by the following extract from the former's Despatch, No. 8 (Rev. For.), dated 28th February, 1867 :—

" In continuation of my Despatches of the 31st October, No. 63, and the 15th December, No. 81, of 1866, I have to inform your Excellency in Council that the selection of the young men to be trained on the Continent for forest service in India has been made by me, after the production of the requisite certificates by the candidates and their examination, conducted partly by Dr. Brandis, Inspector-General of Forests under your charge, and partly by the Civil Service Commissioners, with a view to ascertain the qualifications of the several applicants.

These examinations, as well as that by the Medical Board, were dispensed with in only one instance, that of Mr. Louis Gavin, the son of a deceased British soldier who served through the latter part of the Indian Mutiny, and died as a sergeant-

instructor of musketry in Her Majesty's 71st Highlanders, at Gwalior, in 1860. This young man resided at Nancy, in France, where he had been brought up, and, whilst his physical capacity was shown by a medical certificate, his qualifications and character were vouched for by Monsieur Nanquette, the Director-General of the Forest School at Nancy, under whom all the young men sent to France will be placed, and who has most obligingly assisted the views of Her Majesty's Government in concerting with Dr. Brandis the necessary arrangements relating to this experiment. I therefore added him to the list of selected candidates, the other four being those who had shown themselves best qualified by their knowledge of the subjects required. Walter Henman, aged 17; Alfred Pengelly, aged 23; Edward M'Arthur Moir, aged 18; and Framjee Rustomjee Dasai, aged 20, son of a merchant at Bombay. These four, together with Louis Gavin, aged 18, have been directed to report themselves to Monsieur Laydeker, Directeur-Général des Forêts, at Paris on the 1st of March, to receive instructions for the commencement of their training.

I transmit herewith a copy of the *Règlement*, for this purpose, agreed upon by Monsieur Laydeker and Dr. Brandis, and approved by me in Council.

As these five young men were not, from their want of knowledge of the German language, qualified for training at Hanover, and as it seemed to me important that the experiment should be tried by the employment of men educated in forestry in Germany, as well as in France, I determined to select from the list of candidates who had passed the examinations two more, and have nominated John Kipper Hume, aged 20, and Albert Edward Wild, aged 20, who have been instructed to proceed to Hanover by the 1st of March, and report themselves to Forest Director Burckhardt, who has undertaken the charge of training them.

You will, I hope, therefore, receive seven persons well trained for service in the Forest Department at the end of 1869, or the beginning of 1870."

Brandis' third suggestion had reference to

(3) *A general scheme for permanently improving the administration of the Forestry Department of India by sending out trained men from Europe.*

Brandis explained his proposals with reference to this scheme in his letter to the Under-Secretary of State for India,

dated London, 13th July, 1867. The scientific training of young men for the Indian Service on the Continent had been attacked from several quarters in Britain, it being maintained by some botanical experts that all the training required could be given in the Science Schools of such Universities and Colleges as gave instructions in these subjects, and that the forestry part of the curriculum could be given in a botanical garden or nursery combined with visits to British woods, chiefly Scottish. Further, that a knowledge of German and French was not necessary to the Indian Forest Officer.

At some length Brandis discussed the difference between the scientific conservation of the forests in Germany and France which had been carried on for a considerable period of time (details now well known and therefore unnecessary to recapitulate here) and the management of woods in Britain which, with a few notable instances, and these, compared with continental forests, in comparatively small areas only, was very deficient. He explained the considerable difference in the training demanded of the scientific Forest Officer and that of the Forester who had charge of the British woods, although a long period was to elapse before this difference was clearly understood in Britain. To meet some of the views expressed he proposed, however, to modify his original proposals, and suggested that a year and a half of the period of training of the selected probationer should be spent at a British University or College in studying the natural sciences and so forth, the spring vacation being spent at work in a Scottish nursery. That an examination should then be held unless the certificates of the professors at the University were considered adequate, and that the probationers should then be sent to France or Germany to take a two years' course. As the period of training would be longer he suggested that a sum of £120 a year should be paid to the probationer during these two years.

Brandis' reason for advocating that the probationers should have eighteen months' training in the natural sciences was put forward partly to meet the opposition which had made itself felt at home on the subject of the men being entirely trained on the Continent, and partly because he said it would place the British students on a more level footing with their fellow-students at Nancy, the French students receiving full courses in these subjects before joining at Nancy.

The Government of India had called for the opinions of the Local Governments on Brandis' suggestion for the future

recruiting of the Department with trained men from home, and had solicited the opinions of the Governments of Madras and Bombay in the matter. The correspondence thus elicited is very lengthy and covered a great deal more than the question of the future recruiting of the upper grades of the Services. Cleghorn himself, writing as Conservator of Forests in Madras, was in full accord with Brand and suggested the division of the Department into two classes viz. Upper or Administrative and Subordinate. This would at once differentiate the two classes and render more intelligible the kind of training it was intended to give to the administrative. Cleghorn, a Scotsman and a medical officer, could more easily comprehend, whilst appreciating its dangers, the opposition which had come from Scotland and elsewhere at home on the subject of training the Forest Probationers on the Continent and realised the inability of the opposers to understand, owing to the absence of all scientific forestry training in Britain, what this training really meant. It is impossible to deal with the correspondence here in any detail. The opinions elicited came from Lieutenant-Governors, Chief Commissioners, Conservators of Forests, and Collectors of Districts throughout the country. In the main it was favourable to the future recruiting of the Department by trained men. In this latter connection the question of promotion came up for consideration. At the time each Province or administration had its own department with, in consequence, a very slow promotion amongst the few officers in it. Suggestions were made for dealing with this matter.

A striking passage in one of the answers is from the Chief Commissioner of Oudh in a letter from Colonel C. A. Hutchinson, R.E., Secretary to that Government in the Public Works Department (letter dated 3rd December, 1867). In this letter the following paragraph appears :—

“There being no forests of importance in their own country, Englishmen commonly know nothing upon the subject. They are, for the most part, ignorant even of the existence of the scientific system of management which has grown up on the Continent of Europe, the success of which has been proved by long experience to be complete, and without which, it may be confidently asserted, the destruction of every forest is a mere question of time. In spite of all that has been done, there is probably no Indian forest which is not at the present time in course of destruction. The wanton ruin of the forests which

formerly went on has doubtless been checked, but beyond this there has been little real progress. It is doubtful whether there is a forest, at least on this side of India, in which even an attempt has been made to carry out what Dr. Brandis calls 'the plain fundamental principles of forestry, not to cut more within one year on a given area than is produced within the same time, either by natural growth or by planting.' The common objections that are often heard, that the system which has proved so successful in Europe is not applicable to India, have their origin in ignorance alone. The fact evidently is that, without special education, a man can no more learn to manage a forest than he can learn to be an engineer, or a lawyer, and until this truth is recognised we shall never have an efficient system of forest management in India."

Brandis summarised the evidence in these letters in his Report dated Simla, 28th July, 1868. He recapitulated his previous letters on the subject, and pointed out that the first seven probationers had been selected after an examination in English, etc. He then dealt with his latest proposals and the various suggestions in the correspondence before him, including his own proposals for placing the Forest Officers under the Government of India on to one cadre, graduated scale of pay, and so forth.

The proposals of Brandis had been objected to by the Government of the North-West Provinces, by Colonel Ramsay, Commissioner of Kumaun, and by Mr. Henry Leeds, who had succeeded Brandis in Burma and since been transferred as Conservator to Bengal. The principal objections to the scheme were on the score of expense and "the uncertainty whether the young men selected and sent out after completing their course of training would be able to stand the fatigue and exposure of the forests, whether by temper and disposition they will be fitted to manage the natives of the country, and generally whether they will make efficient Forest Officers." These objections, as Brandis said, applied equally to the Civil Service, Public Works and other Departments, and hardly required discussion. The chief factor underlying the objections was attributable to the fact that youngsters, unable to pass examinations at home, had been sent out to India to obtain appointments in the Government Service, and already the new Forest Service was looked upon as a desirable one for this purpose. This attitude Brandis exposed. Leeds apparently

favoured this method of recruitment. But this gentleman's ideas on forestry education were very rudimentary, as in a subsequent communication he wrote: "In order to master the subject of forestry, after obtaining the certificate of one of the Agricultural and other societies in England or Scotland, a few months' run into the forest land in Great Britain under proper guidance, and a couple of months in Hanover and Germany or France afterwards, is all that is required!" A more noteworthy suggestion, and yet equally fallacious, was the proposal to establish a forestry branch at the Engineering College at Rurki. This had been urged by the Government of the North-West Provinces as early as 1863, and the proposal was again repeated. Brandis admitted that Rurki was favourably situated, but, he added, "*until a series of well-managed forests under different methods of natural and artificial reproduction was in existence in India it would be premature to consider it possible to train the superior grades of the Service in that country.*"¹

The Government of India reviewed the whole matter and reported their proposals and suggestions to the Secretary of State in their Despatch, No. 10, Forests, dated Simla, 19th September, 1868. This Despatch is as follows:—

"After mature consideration of the reports and of the views of the local authorities, we have come to the following conclusions, which we now beg to submit for the sanction of Her Majesty's Government.

We fully acknowledge the necessity of employing the agency of specially trained officers in the administration of the forests in the different provinces of India. These forests, if managed according to a well-considered system, will, we trust, in course of time, come to be one of the most important sources of national wealth for the inhabitants of this country; whereas, if managed by persons ignorant of their profession, their ultimate ruin appears to us to be almost inevitable.

Hereafter we hope that it may be possible to establish a forest school in India, where young men, natives of this country and others, may be instructed in the theory and practice of forestry, and be prepared for service in the Department. Until the establishment of such a forest school in India, however, it appears to us that it will be necessary annually to select a limited number of young men in England, and to send them

¹ The italics are the writer's.

out after they have passed through a regular course of professional training, similar to that which has been arranged for the seven young men now under preparation in the forest schools of France and Germany.

For the present, we consider that it will be sufficient to send out four probationers every year. This will probably not suffice to provide for all vacancies, but it seems right to reserve a number of appointments to be filled up by promotion from the lower establishments, either of Europeans or natives of the country, and by occasionally appointing officers of the army, or other gentlemen in this country, who may possess such qualifications as may make it desirable to secure their services for the Department. Of the specially trained probationers, a few will from time to time be posted to the Presidencies of Madras and Bombay as necessity may arise.

Further experience will show whether the number to be sent out annually should hereafter be increased or diminished.

If arrangements can be made early enough, we would request that candidates be at once recruited this year in time to commence their course of instruction in March, 1869, and to be sent out to India in the autumn of 1871.

As a year has elapsed since the first selection was made, we would suggest that a larger number, not however exceeding eight, be selected this time.

If arrangements can conveniently be made, it appears to us desirable that about one-half of the candidates be sent to Germany, and the other half to France for their instruction.

In the notification inviting candidates, we think that great stress should be laid on active habits and a strong, hardy constitution, and the medical examination should be strict, so as to exclude all those not likely to stand fatigue and exposure in the climate of India.

We further think that candidates should be selected by a competitive examination in the following branches of knowledge :—

- (1) English writing from dictation and English composition.
- (2) Arithmetic in all its branches. (3) Algebra, elementary principles, simple and quadratic equations, ratios and proportion, logarithms, arithmetical and geometrical progression.
- (4) Geometry (1st, 2nd, 3rd, 4th and 6th Books of Euclid) and plane trigonometry. (5) Free-hand and plan drawing. (6) A good colloquial knowledge of either French or German, with

the facility to read and translate the works of some classical writer in the language. These six subjects should be compulsory, and proficiency up to a certain standard should be indispensable for admission. We consider that it will be better to select a smaller number of candidates than to be satisfied with an insufficient preparation, which would prevent their deriving the full benefit from the professional training at the continental forest schools.

It might be useful to add the following branches of knowledge as optional, and to say that proficiency in these subjects would entitle candidates to preference :—

- (1) Surveying and land measuring.
- (2) The elements of any of the following natural sciences :
mechanical and natural philosophy, chemistry, botany, geology.

You will observe that we do not at present advocate the adoption of the plan sketched by Mr. Brandis in his letter to the Under-Secretary of State for India of the 13th February, 1867, received with your Despatch No. 8, of the 28th February, 1867. This plan is doubtless more complete, but it appears to us preferable for the present to maintain the arrangements made for the training of the probationers of 1867, which, if we may judge from the reports received from you regarding the studies of these young men, appear to us to give every promise of proving successful.

Hereafter, when the capabilities of the young men to be sent out by you for forest service in this country will have been tested, we shall better be able to appreciate and to remedy any defects which the present arrangements may possess.

We would therefore suggest that for the present the candidates, whose qualifications shall have been tested in the manner indicated above, be sent to some of the forest schools or other place of instruction on the Continent for their professional training during a period of two years and a half. In addition to this, if it should be found practicable to send the young men to an approved Forester in Scotland for a few months before coming out to India, we should consider such an additional preparation as an advantage.

Having thus explained our views regarding the selection and training of probationers to be sent out from England, we would draw your attention to another subject intimately connected with the first, and, in our opinion, of equal importance for a successful administration of the forests.

Most of the local authorities whom we have consulted concerning this matter have urged the necessity of placing the Forest Department on a more satisfactory footing, so as to afford to all persons entering it fair, and, as far as practicable, uniform prospects of advancement.

Under the existing organisation, Forest Officers entering the Service have very unequal chances of promotion, according to the vacancies which may happen to arise in the Province in which they are serving. Transfers, it is true, have occasionally been made from one Province to another, but the action in this respect of the Government of India has been necessarily limited by the rules for the management of forest business, which we issued in March, 1864, and which were approved in your predecessor's Despatch, No. 16, of 9th June of that year.

Under those rules, the forests in the Bombay and Madras Presidencies, and in the Lieutenant-Governorships of Bengal, the Punjab and the North-West Provinces, were placed altogether under the management of their respective Governors and Lieutenant-Governors. All appointments and promotions of Forest Officers have accordingly been made by them without any reference to the Government of India.

This may have been the correct course to pursue at the outset, but it is now evident to us that the number of appointments in each Province is far too small to make possible a satisfactory organisation of separate departments in the different provinces. We would draw your attention to the data given in Mr. Brandis' Report regarding the number of Forest Officers in the different provinces, from which you will observe that they stand as follows :

Burma, 12 officers ; Madras, 11 ; Bombay, 11 ; the Punjab, 9 ; North-West Provinces, 9 ; Central Provinces, 7 ; Mysore and Coorg, 4 ; Bengal, 3 ; Oudh, 3 ; Berar, 2.

Under these circumstances it appears to us necessary to consolidate all appointments in the Bengal Presidency in one general list, which will not, however, include the Presidencies of Madras and Bombay. According to the scale of establishments as sanctioned at present, this list will comprise :

	Rs. per mensem.
7 Conservators on salaries ranging from	700 to 1,200
14 Deputy Conservators from	500 to 800
28 Assistant Conservators from	250 to 450

and to these will be added, by the end of 1869, seven assistants now under training on a salary of Rs.250 per mensem. Total, 56 officers. In some provinces a few additional appointments will probably before long be required.

If the formation of a general list of Forest Officers for the Bengal Presidency is accepted, all first appointments will be made, either by the Home Government—in the case of the trained officers to be sent out annually—or by the Government of India of suitable persons selected in this country.

All promotions from Assistant to Deputy Conservators from grade to grade within their respective classes, however, we propose to leave to Local Governments, subject to certain rules, which, together with other arrangements of detail, will be considered after the whole scheme shall have received your sanction.

All promotions from Assistant to Deputy Conservator, and from Deputy to Conservator, will be made by the Government of India on the recommendation of Local Governments. The promotion of Conservators will be entirely in the hands of the Government of India.

The promotion of Assistant and Deputy Conservators from grade to grade within their respective classes, however, we propose to leave to Local Governments, subject to certain rules, which, together with other arrangements of detail, will be considered after the whole scheme shall have received your sanction.

The grades and classes of these appointments we propose to arrange in accordance with the following schedule, which, in this peculiar case, we have thought it best to submit for your sanction in this Department :—

I. CONSERVATORS.—1 first class Conservator at Rs.1,600 per mensem; 1 second class at Rs.1,400; 2 third class at Rs.1,200; 3 fourth class at Rs.1,000.

At present the pay of these officers, as shown above, ranges from Rs.700 to Rs.1,200. But the lower rates of pay at Rs.700 and Rs.800 can, we believe, hardly be considered adequate remuneration for the heads of departments in their provinces, though they may suffice for the present, while these appointments are held by comparatively young officers. It is therefore proposed on the promotion of these officers to absorb the lowest class of Conservator on Rs.700 and Rs. 800 per mensem.

And the pay of the first and second class has been fixed

at Rs.1,600 and Rs.1,400 respectively, to hold out a suitable prospect of advancement for faithful and efficient service.

II. DEPUTY CONSERVATORS.—First grade at Rs.900 per mensem; second grade at Rs.700; third grade at Rs.500.

The number of Conservators is fixed, because one is required for each Province. The number of Deputies is at present 14, but, as explained above, some additions may hereafter become necessary. The proportion of the different grades cannot be determined without interfering with the right of promotion from grade to grade by Local Governments, which it is proposed to give them. The pay of the first class has been raised from Rs.800 per mensem to Rs.900, with the view of affording a reasonable prospect of attaining a fair competency to such officers who, either from scarcity of vacancies or for other reasons, cannot look forward to obtain an appointment of Conservator.

III. ASSISTANT CONSERVATORS.—First grade at Rs.450 per mensem; second grade at Rs.350; third grade at Rs.250.

These rates of pay are in accordance with existing arrangements. Young men will ordinarily enter the Department at the lowest rate, and be promoted to the second grade on passing an examination in the languages, and on attaining a certain standard of efficiency.

Their promotion to the first grade would generally take place after three years' approved service in the next lower grade. Under these and similar rules, promotion from grade to grade would be left to Local Governments. You will observe that, under these arrangements, the proportion of assistants of the different grades cannot be fixed, sometimes there may be an excess in the upper and sometimes in the lower grades. If it were decided to fix and determine the number of appointments of each grade, all promotions from grade to grade, as well as from class to class, would have to be made by the Government of India.

The adoption of the scheme here proposed will involve an additional expenditure of Rs.63,800 per annum. This includes the estimated cost of training and sending out four probationers annually, after deducting the share of this outlay to be borne by the Governments of Madras and Bombay. The details are shown in paragraph 48 of Mr. Brandis' Report submitted with this Despatch, and we need not here specially refer to them. Suffice it to say that this increased outlay will

only be worked up to gradually, unless forest establishments should expand more rapidly than is anticipated at present.

This increase is considerable, but it appears necessary, and the examination of details will show that there has been no extravagance in the proposals. The additional expenditure, we feel assured, will be well laid out to secure an efficient administration of the forests, which will ultimately produce a steady and considerable growth of the revenue derived from them.

Nor do we think there need be any hesitation in accepting the present proposals on the score of over-centralisation or interference with the control and patronage of Local Governments.

This difficulty is not felt in the case of the minor administrations, in which the Government of India has always retained a power of control and patronage sufficient for the present objects. But the difficulty is felt as regards the Governments of Bengal, the Punjab, and the North-West Provinces, where all appointments and promotions have hitherto been in the hands of the Lieutenant-Governors.

Nevertheless, we do not hesitate to propose the change, as we feel convinced that a satisfactory organisation of a number of separate and small departments is impossible, and that we cannot hope to secure and retain the services of competent men for the administration of the forests without consolidating the Service in the Bengal Presidency, and thus affording its officers more certain and uniform prospects of promotion.

In adopting this course, and thus assuming a closer control over forest administration in the three Lieutenant-Governorships, we believe to act in accordance with the views expressed in your Despatch, No. 36, of the 16th December, 1867, in which you suggest, with regard to the Department of the North-West Provinces, whether it would not be expedient to consolidate it with that under the charge of our own Inspector-General of Forests, and add: 'It might perhaps also tend to superior efficiency by affording facilities for selecting men of more experience, and affording them a greater field for promotion.'

In this Despatch, indeed, you appear to assume that the management of forests under the minor administrations has been consolidated into one Department under the Inspector-General of Forests. Such a measure has not been carried out,

and is not at present contemplated ; but so much is evident from your Despatch, that you do not consider it necessary that all appointments and promotions in the Forest Department of the North-West Provinces should be made by the Lieutenant-Governor.

We have even considered the expediency of extending the scheme now proposed to the Presidencies of Madras and Bombay. We have no doubt that the administration of forests in the minor Presidencies would benefit by such a measure ; they cannot, we fear, make any satisfactory organisation for themselves on account of the small number of offices which they have at their disposal. And we would strongly express our dissent from the opinions advanced by the Bombay Government and their Conservator of forests, which amount to this, that, for the management of forests, special training is not ordinarily necessary. As long as such views are maintained, we believe that satisfactory progress in rational forest administration is impossible.

But considering all circumstances, we have come to the conclusion that it will be better at the outset to limit the new organisation to the Bengal Presidency, and not to disturb the arrangements already established in Madras and Bombay.

As explained above, however, a proportion of the probationers specially trained in Europe for forest service in India should always be available for employment in the minor Presidencies."

In a Despatch (Rev. For., No. 27), dated 24th November, 1868, the Secretary of State gave his formal agreement to the proposals of the Government of India above described, stating, with reference to Madras and Bombay which were excluded from the proposals, that " the same reasons which have called for an improvement in the prospects of the officers in other parts of India will necessitate a similar concession to the Departments of those Presidencies, including Sind." The Despatch continued : " Before I close this review of this most important Despatch, I must observe, with reference to the eighteenth paragraph of it, in which you state that you do not at present contemplate the consolidation of the ' management of forests under the minor administrations ' into one Department, under the Inspector-General of Forests, that I think it very important that he should now possess the general direction and superintendence of the amalgamated Department

under your Government ; and for this purpose it is necessary that the Conservators should keep him thoroughly informed of all circumstances connected with the forests under their charge, otherwise I do not see how he can be in a position efficiently to advise your Excellency in Council on all points connected with the administration. And although the forests of Madras and Bombay are not under the Inspector-General's control, I think it very desirable that the Conservators of the forests of those Presidencies should freely interchange communications with him. Such an intercourse cannot but tend to an improved administration of the forests, and, in as far as it is suitable to the condition of the several Presidencies, to a uniform system throughout all India."

The attacks on the system of training the Forest Probationers advocated by Brandis, and which thus received the approval of both the Government of India and the Secretary of State, were revived by Memorials addressed to the Secretary of State and by deputations to that Minister (in 1869 and 1870) from three different societies, the Institution of Surveyors, the Highland and Agricultural Society of Scotland and the Royal Horticultural Society of England. These Memorials, the terms of which were almost identical, and the views expressed by the deputations sufficiently display the ignorance existing at that time in Britain on the subject of what really constituted a scientifically trained Forest Officer.

The Memorial of the Royal Horticultural Society was signed by its President, the Duke of Buccleuch ; that of the Institution of Surveyors by Mr. John Chitton ; and that of the Highland and Agricultural Society by the Marquis of Tweeddale. The Memorials represented that the societies had effected much for the improvement of arboriculture, a claim which was granted. The difficulty lay in the fact that the Memorialists had not the requisite knowledge to distinguish between arboriculture and scientific forestry. After stating that they noted with pleasure that the "India Board" had thrown open to competition "the appointments of forest managers in India," they deprecated the necessity of these men being trained on the Continent, "owing to the absence of any recognised system of forestry in England. There can be no doubt that an inspection of some of the great continental forests must be advantageous to the candidates ; but with great respect your Memorialists submit that for the following reasons anything more than a brief inspection is inexpedient and unnecessary." The reasons given

were that the subjects allied to practical forestry, viz. botany, zoology, surveying, etc., could be equally satisfactorily studied at home ; that the system removed the young men from their families and their guardianship ; in the event of a continental war the system would break down (as for a short period actually happened) ; that the valuable experience of those in Britain who had previously served in India would not be available to the students. This experience was not, however, available, since there were at the time no scientifically trained Forest Officers at home with previous Indian experience. That the students would not have a sufficient acquaintance with the foreign language to enable them to profit by the courses. After stating that the probationers would more usefully employ their time in studying in Britain the general land laws of India than in learning the continental forest laws, the Memorialists continued : " The knowledge, experience and other requisites for education in forestry, already exist in this country. The 2,000,000 acres of woodlands (of which 125,000 belong to the State) are amply sufficient for all educational purposes, and there are special advantages enjoyed in Britain which are not to be had on the Continent. Although we have no recognised system of education for agriculture, horticulture, or engineering, still a far higher standard of knowledge, and greater variety of systems, is to be found in England than in any other country of the world ; and in particular the system of forestry followed here is decidedly superior to that of France or Germany, probably owing to the practice in these countries being necessarily directed to an inferior aim, the growing of timber for firewood. It is, moreover, for that very reason, better adapted to the requisites of the Indian Service." Comment is superfluous.

The Highland and Agricultural Society of Scotland added that their Charter of 1856 prescribed a curriculum for agricultural education and the grant of a diploma. They considered that a visit to continental forests was unnecessary, and drew attention to the fact that for more than sixty years the society had devoted its attention specially to the advancement of practical forestry generally and had contributed largely to the introduction into this country of many valuable trees ; and that recently it had instituted an examination in forestry and granted certificates of merit.

The claims of this society were quite justified. But what they and the other Memorialists failed to understand was the

fact that the matter in question was not the training required by the foresters in subordinate grades, but that of the Forest Officer of commissioned rank. Such training did not exist in Britain, nor were the woods capable of providing the object-lessons required. The Highland and Agricultural Society, however, exhibited a shrewd foresight in their last clause, "That while your Memorialists consider the organisation of a system of forestry education in Great Britain as a matter of the greatest importance for the education of Forest Officers for India, they deem it also a question of vast importance to this country, as well as to her various Colonies."

The Duke of Argyll was Secretary of State for India. The Under-Secretary of State in replying to the Memorials recapitulated some of Brandis' reasons for training the probationers on the Continent, and continued :—

"A mere inspection of continental forests, such as is proposed in the Memorial presented by Your Grace (Buccleuch), would not answer the objects which the Secretary of State in Council and the Government of India have in view.

His Grace is not prepared to admit that the same results could be obtained in Great Britain as are gained by the training in France and Germany. He would regard it, therefore, as most unfortunate, should the present outbreak of war between France and Germany lead to an interruption of the present system ; but as Her Majesty is at peace with the Sovereigns of both these States, the Duke of Argyll does not anticipate that any such interruption will be necessary.

I am to add that although the knowledge of the French and German language is required of candidates only in order to enable them to receive the teaching imparted to them abroad, it is a knowledge, nevertheless, which cannot fail to prove of the highest service to them in their subsequent career, as the best books on the science and practice of forestry are undoubtedly written in those languages."

This latter point is very nearly, if not quite, as true to-day as it was when it was written half a century ago.

In forwarding the Memorials and his replies to the Governor-General the Secretary of State, in his No. 27, dated 10th August, 1870, wrote as follows .—

"You will see that I am not able to admit the justice of the conclusions arrived at by the promoters of these Memorials.

I regret, however, to be obliged to add that the unfortunate

outbreak of war between France and Germany has caused interruption to the studies and training of the young men sent for training in 1869 and this year.

The accompanying correspondence will place Your Excellency in Council in possession of the steps that have been taken in regard to these young men. With respect to those at Nancy, you will observe that the sudden break-up of the *École Impériale Forestière* only anticipates the usual vacation of August by a very few weeks. In regard to Hagenau, the preliminary training would have lasted till November. The *Directeur-Général* at present only contemplates a temporary interruption, but has promised as early an intimation of the intentions of his Department as can be given."

It is curious but inexpressibly sad to reflect how history repeats herself. Once again, in August, 1914, the Nancy Forest School suddenly broke up. It was hoped on that occasion that the interruption would be a brief one only. It lasted four and a half years! The Despatch continued:—

"I shall be happy to receive from Your Excellency in Council any suggestions that may occur to you for completing the training of these young men, and also for training those that were to have been sent to the Continent in March next."

The outbreak of the Franco-Prussian war caused an inconvenient interruption of the system of continental training, but once again the breach was filled by the man who had done so much to start forestry organisation in India, Hugh Cleghorn. Cleghorn was at home. In a Despatch, No. 2, dated March 4th, 1869, the Secretary of State notified the Government of India that he had selected eight young men as Forest Probationers to be sent to France and Germany for training, and that he "had availed himself of the presence of Dr. Cleghorn, the Conservator of Forests at Madras, to request that officer personally to inspect the applicants for admission to competition for these appointments. Dr. Cleghorn has executed the task with his wonted zeal for the Service, ability and industry."

On the 15th July, 1869, the Secretary of State addressed (Rev. For., No. 10) the Government of India asking how many probationers should be selected in March, 1870, pointing out that the annual number had been fixed at four, as it was not thought that more would be forthcoming; but that the success of the

last selections and examinations had shown these fears to be groundless. "The growing exigencies of the Forest Department of all India render it most important that a sufficient number of trained persons should be annually sent out until the establishment of the (proposed) Forest School in India has become possible."

The Governor-General's letter (No. 11, Forests, dated Simla, 26th August, 1869) is of interest, as it touches on several points dealing with administrative details on the proposed management of the forests :—

"In reply, we have the honour to report that the necessity of supplying sleepers and wood fuel on a large scale for the State railways, the construction of which has been determined upon, will require a considerable expansion of forest establishments in the North-Western Provinces, Sind and the Punjab, and that eventually the requirements of these railways will necessitate an increase of officers in the forests of the Central Provinces, Oudh and British Burma. At the present time the forest establishments are but ill-prepared to meet this expansion; and under these circumstances it appears to us right not to decline Your Grace's offer to select a larger number of candidates this year than had originally been agreed upon. Eventually we hope that the introduction of native apprentices into the Forest Department, regarding which we had the honour of addressing Your Grace in our Despatch of the 3rd instant, will provide a valuable source from whence to recruit the superior establishments, but the full effect of these measures cannot of necessity be felt for a long series of years to come.

Under these circumstances we consider it desirable that twelve candidates should be selected at the next examination, provided that so large a number of fully competent young men can be found. These probationers will not arrive in India until the end of 1872; but the expansion of the Department must, if possible, be gradual, and we have no doubt that the number asked for will be required when the time for sending out these young men shall have arrived."

The Secretary of State gave his full approval.

For the reasons given in the above-quoted Despatch the Governor-General informed the Secretary of State in September, 1869, that he proposed to appoint the seven probationers selected in 1867, who were expected to arrive in India at the

end of the year, to the following provinces: Mr. A. Pengelly and Mr. F. Rustomjee to Sind; Mr. L. Gavin and Mr. A. E. Wild to the Punjab; Mr. W. Henman (who died within six months of his arrival in India) and Mr. E. M'Arthur Moir to the North-West Provinces; and Mr. J. K. Hume to Burma. Before leaving for India these probationers on quitting the Continent spent a few weeks with an approved wood manager in Scotland under the superintendence of Cleghorn.

In the following year, in response to an enquiry from the Secretary of State, the Governor-General of India in Council wrote (Despatch, Forests, No. 14, dated Simla, 7th May, 1870) on the subject of the number of probationers to be selected:—

“ We have the honour to state that the circumstances explained in our Despatch, No. 11, F., of 26th August, 1869, will still demand an expansion of our Forest Establishments, and that the main difficulty under which the Forest Department labours is still the want of competent men to fill vacancies and new appointments in the Controlling Establishment. We have no doubt that the expansion of the Department under the Government of India will not have ceased in 1873, by which time the next set of young men now to be nominated for training will have arrived. The sooner competent officers are provided for the Forest Department the more rapidly will the training of native Forest Officers progress. On financial considerations, however, we are of opinion that the number of men to be next selected should be restricted, and we would therefore suggest that six may be nominated, provided a sufficient number of fully competent young men can be found. We consider it important that the men to be selected should be of superior standing, and would even desire that a smaller number be selected, rather than that second-rate men should be admitted.

In paragraph three of the Despatch, Your Grace refers for our consideration the questions raised by Dr. Burckhardt as to the best age for commencing the course of training in Germany, and the advisability of extending the term of training from two and a half to three years.

In regard to the first point, we are of opinion that the limits of age might, as suggested, be advantageously contracted; and would therefore recommend that the next notification inviting candidates might stipulate that applicants should be not under seventeen nor over twenty-two years of age.

With respect to the second proposal, that the term of training should be extended, we consider that the change, if carried out, would unnecessarily increase the expense, and would therefore prefer to maintain the existing arrangement, under which two and a half years ought to be sufficient."

In reply the Secretary of State (No. 23, dated 30th June, 1870) thought that the age of twenty-two was too low and recommended twenty-three as the upper age limit. He continued :

" Among the optional subjects I think it advisable to give greater prominence than in former years to the sciences of chemistry and botany.

My Despatch of the 6th of October, 1869, will have informed you that, whilst I look, with you, to an ultimate employment of natives of India in the higher grades of the Forest Department, I am not of opinion that that object is not likely to be attained in any considerable degree until after we have succeeded in establishing a forest school of training in India. And there does not appear to be any readier means of establishing such a school than that of persevering in the system of training which, by the kindness of the authorities in France and Germany, and through the intervention of your Inspector-General of Forests, we were able to begin in March, 1867.

Every Report on forest matters from India furnishes additional proof of the necessity of having the forests under the control of skilled departmental officers, if the forests are to be efficiently managed, and made to yield a proper return in revenue. We must expect to have to continue this system for some years to come. It is desirable, therefore, that I should have as early intimation as it is in the power of Your Excellency in Council to give, in the preceding year, of the number of young men who are to be nominated for training in the following March."

The outbreak of war between France and Prussia brought to an abrupt close the studies of the probationers training in France, as the Nancy school was at once closed. It was in this connection that Cleghorn's services were again requisitioned, as is shown in the following Despatches. On 18th August 1870, the Governor-General in Council addressed the Secretary of State (Forests, No. 22) as follows :—

" In reply to Your Grace's Despatch, No. 23, dated 30th

June last, announcing the steps taken for obtaining six young men to be sent for training to France or Germany in March, 1871, we desire to offer a few suggestions concerning the studies of the twenty young men now under training on the Continent of Europe for service in the forests of this country, in the event of its being found necessary to interrupt their present course of studies in France and Prussia in consequence of the war.

We notice that under existing arrangements eight candidates would be ready to come out towards the close of 1871, and the rest would complete their studies in the autumn of 1872.

Should it become necessary to interrupt existing arrangements, then it would be mainly desirable that before coming out to India all candidates should become thoroughly proficient in surveying, levelling and land measuring, and the elements of civil engineering, specially road making; further, that they should make themselves acquainted with the administration of the Crown forests in England, principally the Dean and New Forest, and that they should spend some time with some experienced Foresters on private estates to learn the treatment of coppice woods and all planting operations. In addition to this, it would be desirable that they should be instructed in certain selected branches of natural philosophy, geology and botany.

In some of these subjects the candidates might receive the needful training in this country at Roorkee; but this plan would be more expensive, their Indian pay being Rs.250 per mensem, or about £300 annually, whereas their allowances during the time of their training at home are only £100 per annum.

As it will be necessary to make special arrangements for their instruction at different places and with different people, it may be found useful to select one of the senior forest officers now at home on leave, and to entrust him with the charge of these young men during the time of their training. He should generally direct their studies, and the half-yearly stipends should be paid on his Report.

In the event of action being taken on these suggestions, it appears to us that Captain E. Wood, late 93rd Highlanders, the Conservator of Forests in Oudh, might be selected for this duty. He was formerly on the Ganges Canal in the Public Works Department, and would, we believe, be able to take charge of their instruction in surveying and engineering;

should Captain Wood's services not be available, we would suggest Lieutenant Doveton, M.S.C., Conservator of Forests in the Central Provinces.

The arrangements here sketched out might also be made applicable to the six young men to be selected in December next, unless Your Grace should decide to cancel the notification inviting applicants.

One year ought, in our opinion, to be sufficient for the preparation here sketched out, and we offer these suggestions merely as a temporary measure in case existing arrangements should be interrupted by the war on the Continent."

The Secretary of State replied (For., No. 3, 6th October, 1870) :

" My Despatches of the 10th and 23rd of August, No. 27 and No. 29, will have shown you that the subject had already occupied my attention, and that with respect to the young men training in Germany it was not anticipated that any interruption would occur. That anticipation has proved correct, as you will see by the half-yearly Report of the progress of the young men, which I enclose, together with the reply which I directed should be made to Dr. Burckhardt's letter.

With respect to those training in France, I regret to say the case is different, as the places in which they were being trained have been among the chief seats of hostilities. It becomes, therefore, necessary to adopt some such measures as Your Excellency in Council has proposed for supplying the training in France thus brought to a close for the present.

In considering this subject, I have been anxious that the measures to be adopted should be such as, besides providing the required instruction, should give a proper supervision and yet be of a temporary character, capable of being put a stop to should the state of affairs in France be so improved as to enable the authorities in that country to resume the training which they have so liberally and cordially bestowed upon these British subjects.

In the plan submitted by your Government it seems to me that it would be attended with considerable additional expense, if an Indian officer on furlough were to go about the country with eleven young men whose education in the special branches named in your Despatch he was to superintend. An officer so situated would require a large remuneration and probably ask for extra leave on service ; and the expenses

of travelling would be considerable, the difficulty of finding accommodation great, and it may be doubted whether the unsettled life would be beneficial to the young men. Moreover, the cares and anxieties incident to such a charge would not tend to recruit the health of an officer who has come to Europe for that purpose; and there would be difficulty in breaking off such an arrangement so soon as might be wished. These objections would, it seems to me, be obviated by adopting the plan proposed in the accompanying Memorandum by Dr. Cleghorn, late Conservator of Forests at Madras, who has, as you are aware, rendered much useful service in regard to the selection of young men, and on other points connected with the Forest Department in India.

You will observe that Dr. Cleghorn has offered his services to superintend the instruction of the young men, the older set in his own village and the younger and larger set in the University of St. Andrews, near to which he resides. In other respects the plan to be adopted will be much the same as that proposed by Your Excellency in Council.

I have therefore determined to accept Dr. Cleghorn's obliging offer for the next few months, on the understanding that should it be possible to resume the training in France the young men would be removed to that country.

The older set, four in number, would remain with Dr. Cleghorn during the winter months, until the commencement of field operations in Scotland, when they would be placed with Mr. McCorquodale at Scone, and Mr. Grant Thomson at Strathspey, successively, and if they did not resume their training in France, arrangements might be made, as you propose, for placing them where they could witness forest operations in the Crown forests of England.

The younger set, consisting of seven, would attend the lectures at St. Andrews, which last from the end of October to the beginning of April, when they would be placed, like the others, under some experienced wood managers, either of the Crown forests or of those of private individuals.

It will not, of course, be right to allow Dr. Cleghorn to undertake this charge without some remuneration, and I have fixed this at fifty pounds a month for his superintendence over the eleven young men, in the manner proposed by him, for the period during which he may be so employed.

With respect to the young men to be selected at the approaching examination, I have decided that it is useless to

invite candidates acquainted with the French language. I shall therefore accept six candidates for Germany, should so many be found competent. In the event of the state of France being sufficiently settled to enable the authorities to resume the training of British subjects, I shall not object to selecting three additional men to be sent to France for that purpose."

In his Memorandum on the subject of arranging for the above training of the probationers under his own supervision, Cleghorn mentions by name Mr. McCorquodale and Mr. Grant Thomson (two well-known Scots Foresters of their day), as they had been employed in this capacity before; but he adds: "Another excellent instructor in plantation work is Mr. McGregor, of Dunkeld, Wood Manager to the Duke of Atholl." He also was a well-known authority of the time.

It is of interest in this connection to note how fifty years ago the Scots Foresters were as eminent for their excellence in nursery work and in the formation of plantations as is the case to-day; and that it was to the north that the probationers were sent to undertake practical courses in these matters.

The Government of India agreed to the above arrangements.

In January, 1871, six probationers were selected who were all to be sent to Germany to be trained, and the Secretary of State stated that owing to the disappointment felt at none being selected for France, he proposed to select three others in the following March who would be sent to France if the courses there had been reopened.

The correspondence on the subject of the training of probationers for the period here considered closes with the proposal of the Governor-General that as nine probationers were selected in 1871 four only should be selected for 1872, and of these three should be sent to France and one only to Germany.

Cleghorn also submitted a Report detailing the progress of the training of the probationers with him. Monsieur Nanquette, on behalf of the French Government, had offered, pending the reopening of the Nancy Forest School, to take four of the senior probationers and complete their training under his own supervision, an offer which was greatly appreciated and accepted by the Secretary of State.

The question of employing natives of India in the Forestry Department received serious consideration towards the end of the period dealt with in this part. In a Despatch (Rev. For., No. 8, dated 3rd August, 1869) the Government of India

forwarded to the Secretary of State a Memorandum by Brandis on this subject. This Memorandum is of peculiar interest at the present day, since it gives evidence of the views which were already held at this early stage in the life of the new Department. That it was not possible to give full effect to them was not due to the Department, to the Government of India, or the Secretary of State. The cause, at this period, lay in the rooted dislike of the Native of India to forest work—a dislike which it has taken many years to overcome.

The question of employing Indians in the administration of the Service had been animadverted on by previous Secretaries of State and, in connection with the reorganisation of the superior branch of the Department which had recently taken place, was being taken up by the Government of India with a view to placing the recruitment of Indians on a more definite basis. The Department, it was considered, offered peculiar advantages for the employment of natives, and it was deemed desirable to encourage their promotion to the higher appointments. The Government of India had therefore directed "that all appointments in the Department, including the highest, should be open equally to all, whether Europeans or Natives of India, who may possess the needful qualifications, and who may have earned their promotion by faithful and efficient service, and that in the promotion of officers, as well as in their first appointment to the Department, the same rules will apply to Natives of this country as to Europeans. We have desired that practical effect should at once be given to these resolutions, and that whenever an opportunity offers the names of deserving native subordinate officers should be submitted for promotion to the rank of Assistant Conservators. We have also suggested for consideration whether, in special cases, native gentlemen of practical experience, who are otherwise qualified, may not be appointed Assistant Conservators at once without any previous training in the lower grades of the Department."

In the meantime Brandis' Memorandum was being circulated to all Local Governments for opinion. In his Memorandum Brandis referred to the steps already taken for training young men in Europe and to the acknowledgment which had been made that the forests, "if managed according to a well-considered system would, in course of time, come to be one of the most important sources of national wealth for the inhabitants of this country, whereas, if managed by persons

ignorant of their profession, their ultimate ruin appeared almost inevitable."

At that time Brandis however held the view that the training in Europe was "of a preliminary and temporary nature, and that the ultimate object to be kept steadily in view was to provide in this country the means of training the men required for all branches of the Forest Department." History shows how it became necessary to modify these views. Brandis was correct, however, in stating "that eventually forestry must become a profession in this country (India) as it is elsewhere, and that the practice of rational forest management must ultimately be as generally understood by the natives of India as the practice of agriculture and the breeding of cattle."

This proposition remains as true to-day, both in India, in Britain and throughout our Empire, as it was half a century ago; but we are far from having yet assimilated it. After dealing with the probationers under training in Europe and the scale upon which it was intended to recruit them, Brandis stated that these men would not be sufficient to fill all the vacancies which would arise in the forest Services: "For if the Department is to do justice to the work it has undertaken, it must necessarily expand considerably for some time to come. . . . Nor is it intended to continue the instruction of officers who have received their training in the forests of Europe beyond a limited number of years. Eventually the Department ought to stand on its own feet, and be independent of men who have received their training in other countries." In making this remark at this early date in the history of the Department, Brandis was not as yet fully aware of the great destruction to which the forests of the country as a whole had been subjected, and of the fact that practical illustrations of what may be termed normal areas of the different species, which would be necessary to provide adequate instruction to forestry students, were not in existence. The following extracts from the Memorandum will illustrate the Inspector-General's point of view and suggestions:—

"Arrangements ought therefore to be made for securing a supply of competent men in this country for those appointments in the superior ranks of the Department that cannot be filled by men sent out from home. Some of the vacancies that may from time to time occur it may be found desirable to fill by the appointment of military officers, and of such young Englishmen

in this country as may be considered to possess special qualifications for the work ; but the majority must eventually be filled by the appointment of natives of this country. But from whatever source they are drawn, it is certain that the candidates ought to be specially qualified for the work.

The arrangements for selecting and training young men, natives of this country, will require careful consideration ; and before entering into detailed proposals on this subject it may be useful briefly to review the present organisation of the Department under the Government of India, and to indicate the direction in which this organisation will probably develop in future. I should mention that none of the proposals and suggestions in this Report refer to the Presidencies of Madras and Bombay.

At present there are in each Province under the Conservator a number of divisional and sub-divisional officers, each in executive charge of a division or sub-division of the forests.

The forest ranges in charge of these officers are so extensive that, in most provinces, the necessity has been felt to sub-divide them, and to establish under each Divisional Officer a number of executive charges of manageable size. In those State Forest Departments of Europe which are organised in the most efficient manner, the average area of executive forest charges varies from 5,000 to 20,000 acres, or, say, from 8 to 30 square miles. Forests of this size can be thoroughly kept in hand by an Executive Officer who is resident on the spot, and has the requisite number of subordinates under him for the watching and protection of the forests. But the yield of the forests in India must first increase considerably before the area of executive charges can be reduced to this extent.

In Sind, where the Government forests are more compact than in almost any Province of India, I found, on my late tour of inspection, that on a total area of 317,245 acres the annual yield per acre amounted to about 5 cubic feet, and the gross revenue from 12 to 13 annas per acre. Some of the richer forest tracts, however, yielded as much as from 7 to 14 cubic feet, and from Rs.1 to Rs.2 per acre.

And although there are some exceptionally rich and compact forests in other provinces which, under systematic management, ought eventually to yield a much larger out-turn, such as the deodar forests of Jaunnsar-Bawar, and Bhagaruttee Valley, some of the sâl forests in Oudh, Kumaun and the Mundla District of the Central Provinces, the bamboo jungles

in the Punjab and the fuel plantations now under formation in the plains of that Province, still, speaking in a general way, we cannot at present expect a much larger gross revenue from the majority of the Government forests than, say, from Rs.100 to Rs.200 per square mile of 640 acres. This is necessarily a somewhat vague guess, as the Government forests in a few provinces only have been demarcated and their area determined. In Oudh the area of the State forests is 700 square miles, and the gross revenue may at present be said to fluctuate between Rs.70,000 and Rs.1,50,000.

These figures will make it clear that we can only afford a moderate outlay per square mile on the protection and management of the forests. Plantations and particularly rich forests excepted, the average extent of executive forest charges therefore will probably, in most cases, not be much below 100 square miles.

Again, assuming that an area of 100 square miles may yield an annual gross revenue of Rs.10,000, it is clear that at the outside not more than from Rs.2,000 to Rs.3,000 ought to be spent on the establishment entertained for the protection and management of such a forest.

On a rough calculation it seems probable that the pay of these Executive Officers will eventually range from Rs.50 to Rs.200 per mensem, or Rs.600 to Rs.2,400 per annum. Under them will be the subordinate officers of the protective establishment, and over them will be the officers of the inspecting and controlling branches of the Service.

The formation of this class of Executive Officers or Forest Rangers, as they may perhaps most suitably be called, has been commenced in a few provinces; eventually, as the revenue from the forests increases, their numbers will increase also, and, as a matter of course, they will generally be natives of the Province in which they are employed."

Brandis then contrasted his proposals with the French Forest Department and stated, "the strength of the controlling establishments is proportionately larger in India than in France (where it is believed that the revenue would increase if the extent of the executive charges were reduced), but the revenue in India will grow and the large extent of the forests requires a larger number of officers. And it should not be forgotten that a considerable proportion of the Deputy and Assistant Conservators are still charged with the executive

duties of their forest divisions"; i.e. still managing directly the several ranges of their divisions.

Brandis pointed out that the newly joined officer of the Controlling Staff in France was appointed at first as a Senior Ranger to executive work. In India, at the time, officers were appointed direct to the Controlling Staff and often to the charge of a division. That could not be avoided but, he added: "the most natural arrangements in this country appear to be eventually to draw the officers of the inspecting and controlling establishments from the ranks of the Executive Officers or Forest Rangers. If this is admitted the question next arises how best to recruit the ranks of the Executive Officers, the pay of whom was to range from Rs.50 to Rs.200 per mensem." Brandis considered that before a man was placed in executive charge of a forest range he ought to pass through a regular apprenticeship, during which he would learn the duties of his profession. The men should be carefully selected with good physique, active habits, a good moral character and with a fair amount of general education. After a period of two years' work in the forests they would be sent to Rurki or other engineering college to undergo courses in mathematics, surveying and levelling and the elements of civil engineering. For those desiring to rise to the higher appointments a competent knowledge of English would be indispensable, but this would not be necessary for those who only aspired to rise to the highest grades of Ranger and wished to remain within their own provinces.

Brandis thus outlined these proposals:

"To carry out these suggestions, two measures appear to me requisite.

First.—The organisation of the appointments of Forest Rangers on a defined plan, which should, as much as possible, be uniform in the different provinces under the Government of India.

The following classification might perhaps be found suitable:

FOREST RANGERS, 1ST CLASS.—1st grade, Rs.200 per mensem; 2nd grade, Rs.150; 3rd grade, Rs.120.

This class would comprise a number of men, Europeans and natives, now employed at these rates of pay under the name of Sub-assistant Conservators, Darogahs, Foresters and Overseers.

FOREST RANGERS, 2ND CLASS.—1st grade, Rs.100 per mensem; 2nd grade, Rs.80; 3rd grade, Rs.70; 4th grade, Rs.60; 5th grade, Rs.50.

All persons drawing less than Rs.50 per mensem might be styled Foresters, say, from Rs.12 and upwards, and those drawing less than Rs.12 monthly might be styled forest watchers or patrols. Foresters and forest watchers would mainly be employed for the protection of the forests, and Foresters of the superior grades would occasionally be entrusted with the executive charge of small forest districts. This part of my proposals would not entail any additional expense at present; existing appointments would be arranged in accordance with such classification as may be adopted, but new appointments would not be made except where, in course of time, the expansion of the work might require it. The appointment, promotion and all other personal matters connected with Forest Rangers and all other subordinate establishments would, as hitherto, remain under the exclusive control of the Local Government or administration. Half-yearly lists of Forest Rangers should, however, be submitted to the Government of India, with brief remarks opposite each individual as to moral character, the nature and mode of performance of his duties, and other matters. Although it may not be deemed expedient to publish these appointments in the *Gazette* the names and charges of Forest Rangers and the names of apprentices should be included in the list of Forest Officers, which are published half-yearly by the Government of India.

The second proposal would be to create for each Province a certain number of apprenticeships, the object being to prepare young men for the executive and controlling branches of the Department. I would suggest two classes of apprenticeships: the rate of their allowance would be a matter for further consideration; perhaps they cannot be fixed alike for all provinces. Rs.40 for the first, and Rs.25 for the second class might be found suitable rates in some provinces. It might be considered whether they could be fixed lower; in that case there would be three classes of Forest Rangers instead of two, the pay of the lowest grade being Rs.30, the rate paid to 4th class darogahs in Oudh. But I feel doubtful whether a suitable class of men will come forward as forest apprentices if the allowances are lower than suggested above. This, however, is a matter on which the local Forest Officers are more competent to give an opinion.

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in the Service. It was unfortunate that ideas of this nature did, in fact, become current for a time in the future. And yet Brandis realised the position, for he wrote :

“ It is very natural that, at the present stage of forest management in India, while the demarcation and protection of the forests against fires, cattle and other injury, are, undoubtedly, the most important operations, the want of a special professional training should not be felt by Forest Officers. But, as operations progress, the want of such special training will certainly be felt as a serious disadvantage. As one out of many cases in point, I beg to draw attention to my late Report on the Sind Forests. At present the quantity of wood and timber taken annually from these forests is supposed to be considerably below the amount produced, and it is therefore not of much consequence whether the cutting and felling is, done on a regular system or not. But let the demand increase, which it certainly will on the construction of the Indus Railway, and great damage will be done, unless each forest is divided into blocks and compartments, and a regular system of working by rotation is established, and unless the cutting and felling is so arranged as to secure the reproduction of the forest, either naturally or by planting and sowing. Such a plan of operations must be framed on the spot by officers who are familiar with that kind of work. The quantity and description of the growing stock, the quality of the soil in each block or compartment, and all other circumstances, which affect the growth of trees and coppice-woods, must be examined, and in arranging the felling operations for a succession of years the supply of labour, the lines of export and the demand for forest produce must be carefully considered.

These are all very simple matters in themselves, yet it is impossible to frame any general set of rules which would guide a person not experienced in such operations. We are as yet very imperfectly acquainted with the habits of our principal forest trees as regards the amount of light and shelter they require in different soils and under different circumstances of elevation, aspect of the slope and climate ; all our operations therefore are as yet of an experimental nature : but it is indispensable that these experiments should be in the hands of men who are familiar with the modes of treatment under which forests in other countries are found to prosper and to yield a considerable and permanent revenue.

We do not expect Foresters from Europe immediately to apply their experience and practice to the forests of this country. On arrival, all have to go, as it were, through a new apprenticeship; they must first become familiar with the requirements of climate and the peculiar vegetation of this country, but if they have been well trained in the principles of their profession they will be able to adapt their past experience to the new circumstances of vegetation and climate. Their experiments will be in the right direction and, knowing what the objects of rational forestry are, they will be able in time to devise the best means for attaining them.

The promotion of Forest Rangers," he continued, "should, as explained above, be in the hands of the Local Government or administration; the number of Rangers of the different grades and classes in each Province should be determined, and after their appointment to the lowest grade their further advancement would be regulated entirely by merit and the occurrence of vacancies. Any Forest Ranger of the first class should, on the recommendation of the Local Government, be eligible for promotion to the rank of Assistant Conservator.

Should the scheme here sketched out be approved, and should it prove to be successful, we may hope, six or seven years hence, to see the first apprentices appointed to the controlling establishment, after having acquired their experience in the executive management of forest ranges. Commencing at that time, the number of officers from this source available for promotion will increase every year, and ultimately, if all goes well, this will be the only, or at least the main, source from which the ranks of the superior forest appointments will be recruited.

Meanwhile it may be possible, from time to time, to promote deserving native subordinates of the Forest Department to the post of Assistant Conservator. Such promotions will be useful as an encouragement to others, and specially to the native forest apprentices to be selected.

But it should not be forgotten that, as far as the progress of rational forest management is concerned, the success of the measures here proposed will entirely depend on our securing, at the present time, as large a number of really competent officers in the superior ranks of the Department as circumstances will permit. Every encouragement should continue to be given to Forest Officers on leave to study on the spot the system of forest management in those State forests of Europe which are

under an efficient and successful administration ; and the measures determined upon last year to secure a supply of men with a special professional training should not be discontinued until the means can be provided in this country for training the men required for the Forest Department."

On the subject of the cost of his proposals we read :

" In conclusion, it seems necessary to frame an estimate of the probable cost of the scheme proposed in this Report. If it were only intended eventually to provide for recruiting the controlling establishment, the number might be limited to seven apprentices annually. In paragraph 24 of my Report of the 28th July, 1868, it has been explained that this will be the probable number of annual vacancies, when this branch of the Department shall have attained its full strength, say, from eighty to ninety officers. But the first object is to provide competent men for the executive branch of the Department, which, as explained above, is now in course of formation only, but which will eventually comprise a large number of officers.

Bearing this in mind, it may perhaps be necessary to sanction the appointment of twenty apprentices annually, and to distribute this number among the different provinces as suggested above. Assuming Rs.25 and Rs.40 as the rates of pay for the two grades, or $32\frac{1}{2}$ on an average, the annual outlay would amount to Rs.650 per mensem, or, say, to Rs.7,800 per annum. In the Report quoted above, the percentage of vacancies in the Forest Department has been estimated at 8 per cent. Twenty apprentices annually therefore would suffice to fill all vacancies arising in a body of 250 officers. This is far in excess of the present number of officers of the controlling and executive branches, but it will be remembered that men are required not only to fill vacancies, but equally to provide for new appointments.

It should here be mentioned that the training of probationers in Europe is more expensive. In paragraph 21 of the Report of July, 1868, it has been shown that the amount expended on each probationer until the day of his arrival in this country will be about Rs.4,000. And as it is proposed to bring out four men annually, this will entail an outlay every year of Rs.16,000.

But then this is only a temporary measure, intended to be continued until a sufficient number of competent officers has

been secured to instruct apprentices and executive officers in their work.

The training of native apprentices here suggested will be a permanent measure if it proves successful, and their numbers will necessarily increase as the Department expands."

The Secretary of State's Despatch (R.F., No. 20, dated 6th October, 1869) to the Government of India on Brandis' Memorandum is of such a lucid nature and deals with the subject from so wide a view-point that it merits reproduction here :

" You transmit a very able paper by your Inspector-General of Forests, Mr. D. Brandis, and your observations on it, remarking that you do not enter into the merits of the proposal, but have as yet merely circulated it for the opinions of the local administrations. You state, however, ' that some regular organisation of the subordinate establishments will, no doubt, be necessary, both to place the administration of the forests on a satisfactory footing, and to secure the preparation of natives for the higher appointments in the Forest Department.'

I entirely agree with the opinions of my predecessors, to which you refer in the opening paragraph of your Despatch, that it is most proper and desirable that we should enlist the services of the natives in the higher grades of the Forest Department, and thereby secure their interest in the preservation of the forests ; and I concur with Secretary Sir Stafford Northcote (paragraph 8 of his Despatch of the 24th November, 1868) in adopting Mr. Brandis' views as to the great importance of such a course towards the stability of our conservancy measures in India, and in the satisfaction with which I shall learn the appointment of any competent natives to positions of trust and consequence in the Forest Department.

There is also a passage in Lord Cranborne's Despatch of the 9th of July, 1866 (No. 48), in regard to the subordinate appointments, which is worth quoting :

' I think it highly important that it should be impressed on all Assistant-Conservators that it is part of their duty to endeavour to train the natives employed in subordinate forest posts, so as to form them into an efficient staff, and give them an interest in the work of the Department. This is an object which will, of course, be only gradually attained, but it is one which the superior European officer may further very much by personal attention and influence.'

I shall not now enter upon the details of the question as

discussed in Mr. Brandis' Minute, since you have deferred any expression of your opinion until you have heard the opinions of the local administrations.

My Despatches in this Department will have shown you the great importance which I attach to the preservation of the forests of India, and my readiness to adhere to the policy of my predecessors with respect to them. The principles laid down of late years have shown that, in order to repair past neglect in regard to the forests, a permanent system, under skilled officers, must be established and steadily pursued; that, in order to effect this, a considerable outlay will very possibly be necessary, but that that outlay will ultimately be well repaid, even in a financial point of view. But the main object is to avert the serious calamity which was rapidly coming upon the country in the total destruction of its forests.

In order to establish this system, and conduct it upon sound principles, officers especially trained in the science of forestry, practical and theoretical, are absolutely necessary; and recourse has therefore been wisely had to those countries where the forests are extensive, and the officers administering them are trained for the purpose, as they are for any other profession. We are also availing ourselves of the practical knowledge which may be acquired on a small scale in this country or in Scotland. We are to continue this scheme of training until we have obtained a sufficient number of skilled officers in India, and the forests, or a part of them, are under such systematic management as to admit of men being trained in India to carry on forest operations.

I allude to these circumstances, not with a view of depreciating the employment of natives, for which I repeat my anxiety, but in order to show that the smaller cost which their employment would entail must not induce Your Excellency in Council to employ them unless they are really competent to take their part in managing the forests. Some preparations will be necessary for them, and time will be required to obtain it. If natives are appointed to posts before they are capable of fulfilling their duties, it will but retard the object we have in view, and irreparable mischief may be done to the forests. The proposal, therefore, which you have made, and to which, on the principles which I have stated, I give my hearty approval, ought not in any way to interfere with the system which we are pursuing, and need not affect the answer which I am expecting to my Despatch of the 15th of July,

No. 10, as to the number of young men to be selected in this country for training in France and Germany. The surest course seems to me to be to hasten on, as far as practicable, the skilled training of all the classes of officers to be employed in the forest service.

You will inform me of the opinions which you and the local administrations may form as to the best measures for accomplishing the object which you have in view, and I can assure Your Excellency in Council that you will find Her Majesty's Government anxious to co-operate with you in any measures which may place the conservancy of the forests of India on a permanently sound basis."

The outcome of these suggestions was, as is now known, the establishment in 1878 of a Forest School at Dehra Dun by the Government of the North-West Provinces and its transference to the Government of India in 1884. But many years were to elapse before the natives of India appeared in any numbers in the higher administrative posts of the Department. Although, as the correspondence above detailed indicates, the opportunity lay in their hands to take advantage of.

so deleterious an effect on the management of woods in Britain :

“ Owing to the reckless destruction of the forests previous to the organisation of the Conservancy Department, crooked timber is now scarce and difficult to find, whilst formerly the abundance of natural crooks contributed greatly to the excellence of Indian teak-built ships.

Nearly one-half of a vessel consists of the curves and ends, and the other half of straighter timber ; therefore, as regards the supply for naval purposes, the production of crooks is as important as the production of planks, and higher prices are given.

This description of timber being so valuable in shipbuilding, it is desirable to watch the progress of young crooked saplings, with reference to future supply, both of the Indian navy and of shipbuilders on the western coast.

In Burma, and in the Anaimalai Forests, it is from the stouter branches and tops of old and lofty trees that crooks are chiefly obtained, but in Canara and in the Circars it is the entire tree which yields the crooks.

In some districts the teak trees are naturally so bent as to render any assistance to nature in fashioning them unnecessary.

To procure a sufficiency of excellent crooks, all overseers in charge of plantations having access to the coast ought to mark such vigorous plants as seem suitable for bending ; not selecting the straight saplings which seem favourable for the growth of plank timber, but tying down the outside and exposed plants which will not probably grow tall and straight.

The plants require to be fixed down for at least two years, and bent a little more than is requisite, as saplings have a tendency to straighten themselves.

A fine regular curve may be obtained by bending a plant for several successive years, lowering a little every year. This gradual lowering does not so much check the growth of the plant.

When teak trees are bent, great attention must be paid to cut away all ground shoots, and also all strong exuberant suckers which stand perpendicularly on the upper side of the tree. It is not wished that promising young teak trees should be thus bent, unless they show a natural inclination to grow in a curved form, in which case nature may be slightly assisted.

At present, for convenience of carriage and other causes crooks are half cut away on either side to form straight timber, thus losing half their substance. Under the economic use of the timber, this would not be the case.

As crooked timber is extremely unmanageable, and its distant transport very expensive, it is desirable that it be squared and cut in lengths suited to its ultimate use where grown ; but this requires either a knowledge of ship carpentry or a careful study.

To procure good crooks and knees, the best way is to look into the forest for such plants as divide into two or four branches and train them in a manner to produce the article required."

The question of taking action to increase the amount of firewood in the Presidency, and so checking the habit of the cultivator of burning cow-dung as fuel with the consequent decrease in the amount available for manuring the fields, had been dealt with by Cleghorn. The matter had been referred to the revenue officials for their opinion, and many of them considered that it would be advisable to give the ryots areas of waste land adjacent to their fields, either rent free or at a small rent, in order that wood for fuel might be grown on them. This suggestion did not meet with the approval of either the Governor of Madras or the Secretary of State. In a Minute by the Governor on the subject he wrote :

" The first step towards increasing the quantity of manure would be to provide the population with a better description of fuel. The loss of labour in bringing in the small amount of wood now consumed, and of preparing the cow-dung, is enormous.

Some arrangement might be made for planting a portion of the waste land of each village with casuarinas, or other trees. I mention casuarinas, for these seem to grow equally well at Madras, in the low country on a level with the sea, on the Mysore plateau, 3000 feet above the sea, and on the Neilgherries, 3000 feet higher still ; it would seem to be a tree very well suited to the climate, and being indigenous, or thoroughly acclimatised, there could be no difficulty in propagating it to any extent from seed. It is a tree which grows rapidly, does not cast much shade, and would not therefore do much injury to crops growing near it ; besides all this, it furnishes the very best kind of firewood. In Australia an

extra price has always been paid for she-oak, as the casuarina was there called. It might also be as well to use trees for the boundary-marks of the different holdings; the present stones, or mounds of earth, are of too slight a character to be maintained for any time, whereas a tree is a lasting mark, which the owners of the land would be induced to maintain by the promise of being allowed to make use of it on condition of planting another in its place.

The effect of planting upon the climate cannot but be beneficial, and it would be well worth the consideration of the Government whether it might not be advisable to provide nurseries of such plants, as might be best suited to each district, at all the stations where there is an officer who could be trusted to look after them; the cost would be very trifling, and the young trees might be given to the natives upon the sole condition of planting them. With a large supply of firewood the necessity of employing cow-dung for fuel would cease, and this would be turned to its proper use as manure; the labour of manipulating and bringing this into the form of small cakes would be saved, and the cost of collecting it would not be more than at present. Changes, however, such as this require time, but this would seem to be a good reason for anticipating the results, and for taking the necessary steps to secure them with as little delay as possible."

The planting of the casuarina had been already taken up keenly in the Madras district, and in reply to a request by the Secretary of State for information on this work the Collector of Madras gave the following details on the subject:

"I have the honour to state that within the last five or six years land to the extent of 5000 'cawnies' has been given in grants for that purpose to private individuals. Of this, by far the greater portion was given on 'tope rules'; but latterly, owing to the great demand for the best casuarina land in the immediate neighbourhood of the sea, I have been able to dispose of some land on the full assessment.

Of these 5000 'cawnies,' 1682 'cawnies' have been already planted, and as, according to the terms of the tope rule grants, each grantee is obliged to plant 20 per cent of his grant each year, in four or five years we may expect the whole will be planted, or the grants of the defaulters will be resumed. At present there is only one plantation of any size of more than six years' growth, and that is 400 acres north of Ennore.



DONKEYS CARRYING CHARCOAL FROM THE FOREST TO THE MARKET, N.W. PROVINCES

Photographed by J. N. Fraser, J. B. Macdonald

The best land for growing casuarinas is close to the sea, and extends the whole length of this district, both north and south of Madras. This land, however, is a mere strip of about a mile in breadth, and is bounded nearly its whole length on the west by the coast canal. All the land within easy access of Madras, and especially to the north, has already been taken up and is being planted. On the south of Madras, the canal not yet extending into town, the lands are not so much in demand, but even there, as far down as Covelong, none but very small portions are available.

The chief holders of the Government grants are Europeans or East Indians; the native landholders are, however, turning their attention to this subject, and have given grants on similar terms to those given by Government.

'Corakapillay' (*Inga dulcis*) is also being grown in this district, but as this plant does not thrive near the sea, the lands for this purpose have been taken up more inland. At the Red Hills, about 12 miles from the sea, about 300 'cawnies' are planted with this description of tree, and as it flourishes on a poor gravelly soil, of which there is a great deal in this district, I am doing my utmost to encourage the planting of it. The casuarina is grown chiefly for firewood, but is also well adapted for rafters and building purposes. The corakapillay is solely grown for firewood, and has the merit of growing stronger after every cutting, and is a famous coppice wood."

So serious had become the decrease of fuel throughout many parts of the Presidency, with the consequent increase in price, that the correspondence on the subject extends throughout the period under review.

In a communication (R.F., No. 2, dated 5th June, 1866) to the Secretary of State, the Governor forwarded a letter from Mr. Dykes, Collector of Nellore, dealing with the steps taken by him for planting wood in that district. The Collector had evidently given a great deal of consideration to this matter, and in ideas and suggestions was far ahead of most of his contemporaries in other districts. To the Secretary of State's obvious surprise he had expressed the opinion that the formation of plantations of casuarina by private individuals near Madras did not affect the general question of the maintenance of fuel supplies in other parts of the Presidency. Dykes gave the following reasons for his opinion:

"In other countries where the people depend on firewood

for fuel, it is on the Government that the duty devolves of preserving a sufficient supply. If in France and Germany, where there is more moisture, and wood can be grown more easily, the Government forests are the chief sources of supply, it seems little use to hope that this Government can, with safety, avoid a similar responsibility ; whilst, as regards the particular instance brought forward as a proof to the contrary, I was of opinion that the rapid growth of a particular kind of tree did not affect the general question, first, because the tree specified only grows so rapidly on the coast ; secondly, because the price it will fetch as timber places it out of the reach of the bulk of the population as fuel ; and thirdly, because grown in the neighbourhood of Madras, it may be with the avowed object of being used as fuel, it by no means follows that similar steps will be taken where there is not so large a demand, and in such neighbourhoods the question of reproduction, if neglected now, may have to be taken up hereafter under such adverse circumstances as may baffle the attempts of either private enterprise or Government.

It is needless for me to refer to the effect of wood in preserving moisture in the ground ; and, in submitting in detail the reasons why I am of opinion that the casuarina movement in the neighbourhood of Madras, and on the sea-coast, does not affect the general question, especially when no such rapid growing tree has been found inland, I would respectfully submit, as an additional reason for husbanding the wood we have got, the effect that such a measure must have on the country at large, and more than all on our irrigation works. That the ryots, when they see that the wood is brought nearer to their homes, will thank us for the exercise of an authority that prevents everyone cutting what remains as they like, is, I think, a matter of little doubt. That those who do wish to plant trees, and that crops generally will be benefited by wholesome restrictions on the present system of denudation, is perhaps equally clear ; and that more moisture being retained in the ground the channels and tanks for irrigation will be better supplied and kept running longer, seems to follow as a matter of course, and is an additional reason for immediate action, if such were required, when the question at issue is of such vital importance as the supply of fuel."

Dykes' planting experiments, to which only one year had as yet been devoted, had not proved successful, owing chiefly to

a failure of the rains after the seed had been sown. He had enclosed and sown up in one case 100 acres and in another 30 acres, including a nursery—but although the seed germinated the plants withered away. The seeds sown were Corakapillay (*Inga dulcis*), Parkinsonia, different species of Acacia, and the Vepa (*Azadirachta indica*) and others. Dykes' opinion on the experiment was as follows: "The season, it is true, has been against us, and the seed was also too old. But the principal reason is probably that, under the most favourable circumstances, it is a difficult matter to plant wood successfully in the plains of India, save at a heavy expense, and the longer we neglect the wood we have, the more difficult, we may infer, will be reproduction. There is nothing to prevent the sun burning the rain out of the ground as soon as it falls, and with no moisture vegetation becomes impossible."

The Collector expressed the opinion that better results would be obtained by carefully enclosing natural areas of jungle copse. There were some 6000 acres, including the hill to the westward of the Nellore tank, excluding the position occupied by the Narasimmakonda Temple. This land was so situated that, with the aid of the village authorities and four woodmen whom he had appointed to supervise the area, it could be successfully watched. Dykes fully appreciated the destruction caused by unlimited grazing in such areas, for he added: "When the cattle tax is abolished on the introduction of the new settlement, and we are able to exclude cattle so far as necessary, the experiment will be still more complete. I have made wood roads, 30 and 15 feet wide to facilitate watching, which will hereafter be available for the measurement and removal of the wood. These roads have been formed by cutting down the wood, stubbing up the trees after the rains and levelling." A sketch map had been prepared for the area. On 7 acres of this jungle tract, which was in effect a copse, Dykes had enumerated the stock. It comprised thirty-seven species of small trees and thorny bushes, nine of which yielded small timber, one fruit, and the rest firewood. He had made a thinning on these 7 acres, and his plan of operations proposed extending this thinning gradually to the west of the area. This was a remarkable piece of work to have been carried out at the period by a Collector on his own initiative, and the Conservator on visiting the area expressed high approval of the operations. Dykes' opinion on the best methods to ensure the fuel supplies were

also sound, and received the endorsement of the Secretary of State.

The latter (in a Despatch to the Governor of Madras, No. 29, dated 16th August, 1866) expressed the following opinion on the Collector's conservancy work : " I agree with Your Excellency in Council that no correct conclusion can be drawn from the failure of the plantations in a single year, especially if in that year the season was, as it seems to have been, adverse to the object in view. It is probable, however, that, for some time at least, the great source of supply will be derived from the preservation of the naturally formed jungles, and the measures taken by Mr. Dykes for this purpose seem to have been both judicious and economical. The small outlay which you have sanctioned seems to have been well employed, and Mr. Dykes deserves commendation for the interest which he has displayed on this subject and the judgment with which he has planned and executed his project.

The account of the success of the casuarina plantation near Madras, and the manner in which the natives have followed the example set them, is very satisfactory. This experiment, it may be hoped, will have a similar result to that which has attended the like measures on the coast of France, where the inroads of the sand have been stopped by the planting of the *Pinus maritima*, and a large extent of country been thereby brought under profitable cultivation, besides the considerable revenue derived from the plantations themselves."

The reference to the famous maritime pine forests in the Landes on the west coast of France gives evidence of the fact that pains were now being taken to obtain a knowledge of the conservancy methods in force on the Continent of Europe. It was natural that experiments should accordingly be made with the object of introducing such a valuable conifer into India ; it being remembered that at the period little knowledge existed on the climatic requirements of such species and the only too probable failures which must result from the introduction of species unsuitable to Indian conditions. At the end of the year we find the Secretary of State forwarding 2 cwt. of *Pinus maritima* seed to the Governor of Madras to be sown in that country.

In a Despatch (R., No. 2, dated 12th February, 1867) the Governor of Madras forwarded to the Secretary of State an extensive correspondence received from the Collectors of districts containing information as to the steps taken to

increase the general supply of fuel in the country. The Collectors had now expressed an almost unanimous opinion that private enterprise was not likely to meet the increasing demand for fuel, and the Madras Government had accordingly deemed it proper to authorise the reservation and protection of extensive scrub jungles. The largest of the jungles so reserved was in the Salem district, where six tracts aggregating 12 square miles had been reserved. The total cost of this reservation work would amount, it was estimated, to Rs.7000 in the first year, with an annual outlay of Rs.500 only in the following years—a sum far too small to effectively carry out the work it was desired to effect. But at the period this parsimony in providing a sufficient staff was common throughout India, a result of the as yet imperfect knowledge extant of the work involved.

The question of the depletion of fuel supplies in the Presidency was aggravated by the advent of the railway, which burnt wood-fuel. It had become a serious competitor for this commodity with the villager, and it was realised that, with the great increase in the cutting of firewood, which was taking place all along the railway line, the scrub jungles within its neighbourhood would soon be cut out and disappear.

On this subject the Locomotive Superintendent of the Madras Railway, in a letter dated 21st December, 1856, wrote : “ We have just commenced burning wood between Palghat and Beypoor, so that our issues from Palghat will be greatly increased. We shall probably require an additional monthly supply of 1,200,000 lbs. (about 290,000 cubic feet per acre) for that portion of the line.” The Conservator addressed the following letter to Government in this connection :

“ During my late journeys on the Madras Railway I have been struck with the favourable growth of wood in the Palghat gap, and observed that fuel is conveyed by almost every train from the west of Coimbatore eastwards as far as Erode.

The wooded country occupying the notch between the Koondah and Anaimalai ranges was famous for wild elephants, but the extended cultivation along the line, and the increasing demand for wood, have jointly contributed to clear the primæval forests, and there is now only a thin scattered jungle.

The land west of Palghat is entirely private property, and in the Coimbatore district the jungle is being rapidly taken up

for cultivation, both in the vicinity of Walliar and in the adjoining valleys of Anaimalai and Bolumputti.

The question of railway fuel is daily forcing itself upon the attention of the different administrations of the Empire, and after much reflection as to the prospective wants of this Presidency, I beg to suggest that a compact block, say, 5000 to 6000 acres, be reserved at once, not for skilled and expensive planting, but for the spontaneous and unrestrained reproduction of wood. The provision of a constant supply of fuel at Palghat calls for careful consideration."

It may be mentioned that to provide the estimated railway requirements this area would have to yield 50 cubic feet per acre per annum ! The Conservator drew attention to the letter from the Locomotive Superintendent above quoted and continued—

"The Collector suggested the course now recommended, and has offered to assist me in the matter ; I request that he be empowered to take the necessary steps. I limit my application to the extent specified at present, but the Collector might be instructed to enquire what amount of land is available, without prejudice to existing rights.

It is desirable that the land taken up be as near as possible to the western limits of the Coimbatore district, the moisture being greater on the verge of the ghâts, and it should, if possible, be close to the Walliar Station.

I have just returned from Nellore, and have seen in a much drier climate the successful management of a reserved tract, the productiveness of the jungle being much increased by excluding cattle, clearing away creepers, and other simple measures of conservancy."

The Board of Revenue (March, 1866) was asked to instruct the Collector of Coimbatore to mark off and reserve the land above referred to by the Conservator, and the latter was directed to report on his proposed arrangements for preserving and working the tract.

As will be shown later, in the case of the Punjab Railways, the Secretary of State had vetoed the suggestion that the Railway Management should expend railway moneys on the formation of plantations maintained for railway fuel supplies. The Secretary of State held that money provided for the building and extension of the railways could not be devoted to an enterprise so far removed from direct railway construction work and maintenance. An application at this date from the

Madras Railways to the same effect was consequently disallowed. The work of making a proper provision of fuel for the purpose was held to fall within the province of Departments maintained for the purpose.

By June, 1866, Lieutenant Walker was engaged on the work of reserving "5000 acres of firewood jungle at the extreme western limit of the Coimbatore district, and near the line of railway." He was also giving attention to the locomotive fuel requirements in the Salem district, and the reservation and conservancy of the tracts of firewood jungles near Ahtoor and Malliaporam. "This method," said the Conservator, "will always be far less expensive than forming plantations, and if cattle and fire can be kept out of these tracts, and felling carried on with system, and some attention given to conservancy, the yield of firewood will be considerably enhanced. Dr. Cleghorn and I had several consultations on the subject of forming plantations to meet the future fuel requirements of the railway, and we agreed that if the Locomotive Department continued to use firewood as fuel to a great extent, it would eventually be necessary to form large plantations in the following localities: (1) near Erode, (2) near Bangalore, (3) beyond Cuddapah, (4) near Arconum. West of Coimbatore the humidity of the climate will always ensure an abundant supply of fuel without artificial planting.

Full information from the railway company seems necessary on the following points: (1) source of present supply, (2) their experience as to what timbers yield the best fuel, (3) estimate of prospective requirements.

Plantations of this kind will have to be undertaken by Government or the railway department, as it is not probable that private enterprise will ever do anything in this way."

In an Order (10th July, 1866) on the above letter the Conservator was requested to communicate at once with the Collectors concerned, with a view to the reservation of suitable tracts in the neighbourhood of Arconum, Cuddapah and Erode. The papers relating to the subject of fuel reserves for railway purposes would be communicated to the Commissioner of Mysore, with reference to the proposal to establish a reserve near Bangalore.

The trouble at this period in Madras, and for some considerable time thereafter, was due to the reluctance of many of the Collectors to realise the importance of the Forest Conservancy question; and, in consequence, to the half-hearted manner in

which they supported the efforts of the Forest Department. And the Collectors often received the support of the Board of Revenue, who were still but lukewarm partisans of the Forest Conservancy business. In April, 1869, we find the Consulting Engineer for Railways addressing the Madras Government, Public Works Department, on the serious question of fuel supplies. This letter and the Conservator's remarks on the subject give a clear summary of the position of the question at the time.

In his letter (No. 117, dated 8th April, 1869) the Consulting Engineer shows that on the last five years' average the cost of coal at the stations along the north-west line beyond Cuddapah ranged from Rs.33 and Rs.40 a ton. Coal was the cheapest imported fuel at the time, and as 3 tons of firewood were taken to be equivalent to one ton of coal, it could be assumed that the Madras Railway Company would be able to pay from Rs.10 to Rs.12 per ton for firewood at the stations beyond Cuddapah. On the subject of the existing prices of firewood the Consulting Engineer wrote :

“ The cost of firewood is at present regulated entirely by the rate of seigniorage charged by Government. This was lately raised from 6 annas per 1000 lbs. to 10 annas, or to 22½ annas per ton. There can, however, be no doubt that, even with this enhanced rate of seigniorage, the cost of firewood cut in Government jungles is at present far below the cost of production. Such a condition is not only wrong in principle, but operates most prejudicially by preventing the growth of firewood by private enterprise. The opinion of the Government has been repeatedly recorded as to the impolicy of allowing it to continue. Its vicious operation is shown most clearly in the present instance, where the ease with which firewood can be obtained from the Government jungles furnishes the railway authorities with an argument against paying a price more nearly resembling the cost of production ; and such an argument necessarily tends to prevent any artificial cultivation, even by the agency of the Forest Department.

So far as the railways in this Presidency are concerned, the question is one of vital importance. For their supplies of coke and coal they are, in all probability, likely to be for ever dependent upon external sources ; and, in the event of England being engaged in a naval war, the nearest available source of supply would be the coalfields of Northern India, from which

a land carriage of some 2000 miles would be inevitable. Under those circumstances, if there were no reserve of firewood from which to draw their supplies of fuel, the railways could not be worked, except at a cost largely in excess of the present rates."

The fact that with the passing of the years some of the Engineer's arguments have come to be proved fallacious does not detract from their soundness at that juncture. His allusion to what would happen if a naval war occurred is quite prophetic.

The following table shows the consumption in tons of the different kinds of fuel during the years 1867 and 1868 by the railway companies in this Presidency :

	Madras Railway.		Great Southern of India Railway.		Conjeveram Railway.		Total.	
	1867.	1868.	1867.	1868.	1867.	1868.	1867.	1868.
Coke . . .	1,488	1,909	23	32	—	—	1,511	1,941
Coal . . .	5,191	3,584	3,513	2,791	167	43	8,871	6,418
Patent Fuel .	364	3,259	—	462	—	1	364	3,722
Firewood .	49,235	48,068	1,923	5,923	14	367	51,172	54,358

The Consulting Engineer advocated the raising of the rate for firewood and agreed with the proposal of the Forest Department that it should be increased at an early date to Rs.1 for 1000 lbs. or Rs.2.4 per ton. That this enhancement should not, however, be regarded as final; but that the rate should be gradually increased until it more nearly assimilated the cost of production. The Engineer asserted that the enhanced rate should not be paid by the railway only, as the Conservator of Forests had suggested (an extraordinary short-sighted proposal to make), but should be payable by all, a suggestion to which the Government agreed.

As has been mentioned, the railway authorities had been considering the advisability of forming plantations of their own, a policy which, though supported by the Madras Government, had been vetoed by the Secretary of State. The Consulting Engineer is not on such sure ground when he deals with this plantation matter. He wrote: "I take this opportunity to represent to Government the very great importance which I attach to the early formation of a firewood

plantation on an extensive scale at some convenient point upon either bank of the Cauvery above Erode. So far as the railways are concerned, the situation would be a singularly favourable one, inasmuch as a large supply of firewood delivered at Erode would be available for the Madras Railway in both directions, and for the Great Southern India Railway. With water carriage to Erode, available throughout most of the year, it matters little how far it is necessary to go up the Cauvery before a suitable site is reached.

In a letter, dated 12th May, 1868, the Officiating Conservator of Forests informed me that he had under consideration the formation of a large firewood plantation on the banks of the Cauvery near Cauverypooram, some 50 miles above Erode. It was with great very regret that I learnt in a letter (No. 1217, 9th March, 1869), which I have the honour to submit, that up to the 9th ultimo no progress had been made towards forming the plantation, and that it was doubtful whether suitable land could be obtained. I beg that the Forest Department may be urged to take early and decisive action in this matter. The progress of denudation in the jungle tracts, which have hitherto fed the railways, renders the question one of national importance, and no small plantation near Bhowany can remedy the evil. It is difficult to believe in the existence of any insuperable difficulty in the way of acquiring suitable sites for the establishment of plantations on a sufficiently large scale."

As a matter of fact, there were serious difficulties in the way, and not the least the lukewarmness of the Collectors to assist in the matter, which attitude was translated into active opposition by their Indian subordinate staff. The Engineer concluded his letter as follows: "Whether or not the formation of plantations upon these sites," he was referring to two areas which had been taken up by the railway authorities to form plantations before the Secretary of State's veto had arrived, "has as yet been undertaken by the Forest Department, I am ignorant; but I must respectfully press upon Government the necessity which exists for immediate and vigorous action on the part of that Department throughout those districts, at least, in the Presidency which are, or are likely to be, traversed by railways. By the decision of the Secretary of State, direct action in the matter on the part of the railway companies has been precluded, and private individuals also are effectually prevented from embarking their capital in

such an enterprise, so long as, owing to the lowness of the rates of seigniorage, it continues to be cheaper to procure firewood from the tracts of natural forest than to grow it. In the meantime the resources of the country, especially in the neighbourhood of the railways and the large towns, are being rapidly exhausted and, in the interest of the Department under my control, I feel it my duty to urge the necessity of extensive operations being promptly undertaken by the direct agency of the State."

In a letter (June, 1869) on the above suggestions and proposals of the Consulting Engineer, Beddome agreed to the suggested increased rate for fuel, this rate to be for fuel of the size used by locomotives and not to be paid for small firewood sticks. The question of the formation of a large plantation on the banks of the Cauvery above Erode was still under consideration, said the Conservator. Colonel Morgan had inspected the area and been in communication with the revenue authorities, and said there was no suitable land available. The Consulting Engineer had disposed of the local Locomotive Superintendent's (at Erode) contention that he would not be able to pay more than Rs.5 per ton at Erode, whereas Morgan estimated that it would not be possible to deliver fuel there at less than Rs.10 per ton. But Beddome had by now grasped at the real solution of the problem, as his following remarks show :

"There are very large, I may say almost inexhaustible, forests within short distances of the Cauvery River above Erode: if a tramway could be made from any of these to a navigable part of the river, large rafts of timber and boats laden with fuel might be brought down to Erode. The subject is well worth the careful consideration of the railway company.

The dense 'shola' forests on the Bolamputty Hills, the Paulghaut Hills and the Anaimalais, may be said to be quite inexhaustible, and are all within a short distance of the line; the advisability of having tramways to any of these tracts should be considered.

There is a very large extent of hill-forest in the Salem district quite contiguous to the line. The jungles of the plains have been heavily indented upon for fuel to a considerable distance, but no timber has as yet been taken from the hills, or the ravines on the slopes. These hills contain a great deal

of wood that is of no use except for fuel ; but I am not sure that the supply is sufficient to authorise a tramway, but a timber slip would probably pay well.

We have little or no data to enable us to make even a rough estimate of the cost of producing fuel from plantations. With the exception of casuarina, I believe it will be very heavy in those districts where it is most required. Under these circumstances I do not think we should attempt plantations at first on any very large scale, and unless they are upon an enormous scale they will, I feel sure, be quite inadequate to meet future requirements, and tramways will eventually be resorted to. If this be the case, the sooner they are commenced the better. The traffic in timber, besides fuel from tracts like the Anaimalais and Pennagra Forests, would be very considerable.

Plantations are mostly required in dry, timberless countries, like the Ghooty district ; it is in these districts, however, that they will be most expensive. We have now commenced a large plantation of upwards of 600 acres in a most favourable locality near Ghooty, and two smaller ones between that place and Cuddapah. I am not very sanguine as to the results, as I am afraid the cost will be very heavy, particularly if we have unfavourable seasons like this and the last three years. It is, however, quite right that it should be tried ; but I would not recommend any great extension till we see the results of two or three years. I am giving every attention to the trial of various kinds of trees.

The casuarina plantation at Trivellum promises to be a success ; it is about 350 acres in extent, and we now have upwards of 30,000 young trees planted out, which show rapid growth ; the nurseries are full of plants ready for transplanting out, but the season has been most unfavourable.

I cannot quit this subject without pointing out the importance of bringing all fuel-yielding tracts in the vicinity of the railways under one administration. At present certain tracts under Collectors dovetail with ours ; these are not worked on any system and have no establishment, and the fuel from them is certainly, in some instances, brought in without any payment for seigniorage, and they interfere much with our arrangements for checking smuggling. Again, there are considerable tracts of 'zemindary,' or private forests, which it would be advantageous if Government could lease at almost any cost."

The Government orders on the above sanctioned the increased rates for fuel without distinction, and ordered detailed proposals to be submitted, both on the suggestion *in re* the use of tramways and on the subject of the proposals anent the leasing zemindary or private forests by Government.

That the progress of the Forest Conservancy in the Presidency was slow and the work difficult, owing to the unfortunate attitude taken up by many of the Revenue officials, becomes only too apparent from the correspondence of the period. The following extract from a letter from the Acting Collector of Cuddapah to the Secretary, Board of Revenue (7th April, 1869), on the subject of the Conservator's desire to take up an area of land in the district for the formation of a railway fuel plantation, is apposite :

" Last year, in North Arcot, I decided that the Forest Department should pay the assessment upon a bit of land they wished to take up ; but I observed lately, in one of the Board's volumes, that on Mr. J. D. Robinson's recommendation the Board upset my decision, and ruled that the Forest Department should have the land free of assessment.

If the Board see no objection to the application of this principle to all lands required by the Forest Department, the simplest plan, in the present instance, will, of course, be to make a permanent deduction in the land revenue by reducing the ' shrotriendrar's ' ' jody.'

I cannot, however, myself see why the Forest Department should be favoured to the extent of being permitted to increase its revenue at the expense of the land revenue.

The Board will observe that, in the same Proceedings, I am ordered to hand over to the Forest Department another tract between Cuddapah and the Papugny River. It consists of 450 acres, 250 of which have been, and the remainder was about to be, planted from local funds.

The Jungle Conservancy branch of local funds is sadly wanting in stability. One day the Forest Department demands, and obtains more old forest, thus materially reducing our jungle conservancy income, and the next we have to hand over to them, on refund of the bare outlay, what we fondly hoped would be a remunerative investment, on behalf of the local public in a new railway fuel plantation. It is hoped that the Board will appreciate the difficulty, under these

of wood that is of no use except for fuel ; but I am not sure that the supply is sufficient to authorise a tramway, but a timber slip would probably pay well.

We have little or no data to enable us to make even a rough estimate of the cost of producing fuel from plantations. With the exception of casuarina, I believe it will be very heavy in those districts where it is most required. Under these circumstances I do not think we should attempt plantations at first on any very large scale, and unless they are upon an enormous scale they will, I feel sure, be quite inadequate to meet future requirements, and tramways will eventually be resorted to. If this be the case, the sooner they are commenced the better. The traffic in timber, besides fuel from tracts like the Anaimalais and Pennagra Forests, would be very considerable.

Plantations are mostly required in dry, timberless countries, like the Ghooty district ; it is in these districts, however, that they will be most expensive. We have now commenced a large plantation of upwards of 600 acres in a most favourable locality near Ghooty, and two smaller ones between that place and Cuddapah. I am not very sanguine as to the results, as I am afraid the cost will be very heavy, particularly if we have unfavourable seasons like this and the last three years. It is, however, quite right that it should be tried ; but I would not recommend any great extension till we see the results of two or three years. I am giving every attention to the trial of various kinds of trees.

The casuarina plantation at Trivellum promises to be a success ; it is about 350 acres in extent, and we now have upwards of 30,000 young trees planted out, which show rapid growth ; the nurseries are full of plants ready for transplanting out, but the season has been most unfavourable.

I cannot quit this subject without pointing out the importance of bringing all fuel-yielding tracts in the vicinity of the railways under one administration. At present certain tracts under Collectors dovetail with ours ; these are not worked on any system and have no establishment, and the fuel from them is certainly, in some instances, brought in without any payment for seigniorage, and they interfere much with our arrangements for checking smuggling. Again, there are considerable tracts of 'zemindary,' or private forests, which it would be advantageous if Government could lease at almost any cost."

could not be deemed by any means high ; indeed, so far from its being excessive, as alleged by the Railway Board, it is less than should properly be charged ; and, under the circumstances set forth in our Proceedings, we are strongly of opinion that the rate may hereafter be gradually raised until the price of fuel obtained from natural jungle is more nearly assimilated to the cost of artificial production. We therefore decidedly deprecate any reduction in the present rate."

This dispute and discussion over the ruling fuel supplies, a question which was agitating Local Governments and administrations elsewhere in India, had its bright side for the Forest Department, as the final paragraph of the above Despatch indicates :

" We forward a Report from the Conservator of Forests on - the quantity of fuel reserves actually existing, and upon the wants of the Forest Department for the purpose of increasing them to the required extent. We have given his proposals our most careful consideration, and we concur with him in believing that if any real progress is to be made in the matter of the railway fuel supply it is essential that the Forest Department should be strengthened to some extent ; and, having in view the importance of early action in this matter, we have directed the immediate nomination of three third-class Assistant Conservators to the Department, and have instructed Major Beddome to report what additional subordinate assistance he will require for the charge of the fuel reserves already existing, and for those about to be created. We have reported our Proceedings on this subject for the confirmation of the Government of India."

By the end of 1870 the Government of India noted with satisfaction that, in compliance with their oft-repeated suggestion to the Madras Government as to the necessity of demarcating suitable forest tracts to provide a permanent supply of fuel for the working of the railways in the Presidency, good progress had been made. Forest blocks had been demarcated in the Cuddapah, N. Arcot, Salem and Coimbatore districts, aggregating 17,000 acres or about 26 square miles. The Conservator had estimated that nearly 100 square miles would be required, basing his estimate on the assumption that 50 acres would cover the average annual requirements of one mile of railway, four trains running daily. The estimate

was framed on the advice of Brandis and Dr. Stewart, Conservator in the Punjab. But the Government of India rightly said that there were no data before them regarding the yield of wood per acre under different conditions in the country. There were many varying factors, one that growth would be slower on the east than the west half of Madras. Also the length of railway lines constructed or sanctioned was 1340 miles. In addition at least 100 more miles would be sanctioned. In fact, that as the formation of the reserves would take time, the railway would expand, and it would therefore be advisable to take up a larger area than then contemplated, as it would not be difficult to dispose of the surplus land at a later date. Moreover, in addition to the lines in the Madras Presidency, there were the railways projected in the Mysore territory. The necessity of taking measures to provide a supply of fuel for these lines had already been urged on the Chief Commissioner of Mysore. The Government of India, in view of the importance of increasing the Staff of the Department in Madras, sanctioned the entertainment of the three additional third-class Assistant Conservators.

The reminders addressed by the Government of India to the Governor in Council in Madras on the necessity of demarcating areas of reserved forest as soon as possible to prevent the alienation of the land were needed, as several instances of Government forest lands having been given up by the Revenue authorities to private individuals without the consent of or knowledge of the Forest Department, had come to light. The Secretary of State had addressed (23rd July, 1868) a strong-worded protest on this subject to the Governor in Council, Madras, demanding full reports and the amount of loss entailed to the Government by such unauthorised alienations.

Of a somewhat different nature, though often of very great historical interest, were claims made to forest lands on a larger scale, claims often supported by powerful native interests with but superficial proofs, often of a doubtful nature, to sustain them. A famous one, which was at length disposed of during the period here dealt with, was the claim of the trustees of the Tirunhally Temple in the Wynaad Taluk of the Malabar district to certain forest lands situated round the temple site. These claims had already been rejected by the Government of Madras on the ground that the lands had escheated to Government on the rebellion of the Pychee Rajah, who had openly resisted the British when the Taluk of Wynaad was

ceded to us by Tippoo Sultan in 1799, the said Pychee Rajah having died in open rebellion against us in 1806. After the suppression of the latter rebellion the estates of all concerned in it were forfeited ; but in the absence of any survey or land register, and in consequence of the unhealthy and unsettled state of the country, only a very small portion of the escheats was really taken possession of. In 1824 the Collector, Mr. Vaughan, had issued a proclamation enumerating the lands which were escheats, but he only referred to lands paying rental as well as assessment, and did not include the forest or waste lands. In 1859 the claims of Government to lands in the Wynaad had been brought before the Board of Revenue. Considerable areas which could have justly been confiscated were allowed to remain in the hands of their occupiers. In all other cases where no one claimed ownership of the land Government took possession ; and where ownership was claimed full opportunity was afforded to put in proofs of ownership.

In 1862 the settlement officer in the Wynaad wrote a Report on this case. The trustees had due notice of the enquiry, but produced no documents. In 1865 they applied direct to the Secretary of State and said they had documents. These were subsequently produced before the Collector of Malabar and were shown to be worthless. All that the trustees could show was that they had on isolated occasions, commencing in 1823, exercised proprietary rights in the forest, and that on one occasion their claim was recognised by an officer of Government. On the other hand, it was proved that the officers of Government had on frequent public and unmistakable occasions exercised similar rights on behalf of Government without opposition. In 1845 the Kotiete Rajahs filed a suit with reference to this property. When the Collector intervened and represented that the lands were an escheat, the trustees remained silent. In 1853 the trustees sued the Collector for granting a premium to plant coffee on one of the hills ; they were non-suited, and appealed in vain to the higher Courts. The Government of Madras felt, therefore, that they were on safe ground in forwarding the memorial without further remarks on their part. The Secretary of State agreed that the Memorialist had no case, but concluded his Despatch with the following remark :

“ Referring, however, to the great reputation enjoyed by this temple, and the reverence in which it is held throughout

a large tract of country, I think it desirable that great care should be taken not to offend the prejudices of those who so esteem the temple. This, it seems to me, may be avoided by preserving the forest and jungle in the immediate neighbourhood of the temple, and handing it over to the Forest Officers for conservation, with a caution that no measures should be taken which are likely to run counter to the feelings of those who come to the shrine."

This case has been alluded to in detail, because it is typical of claims to forest property of the same kind which were made all over the country for long years once its value had come to be understood. For, as has been shown, at the beginning of the century neither Government nor people considered the forest as having any value at all; that, in fact, forest land was only valuable when it had been cleared for agriculture and so could be made to bring in land revenue.

The progress of the Conolly teak plantations at Nilumbur was uniformly satisfactory during the period under review, an Assistant Conservator, Mr. Ferguson, being in charge of the plantation and division. In a Despatch (R.F. No. 6, dated 24th February, 1868) the Secretary of State for India, in commenting on the satisfactory position of these plantations, wrote: "I fully approve of continuing to designate these plantations the 'Conolly plantations,' in remembrance of the wisdom and forethought of the founder." Every Forester will heartily endorse this sanction.

In a Report on the division, dated 27th April, 1870, Mr. Ferguson gave the following note on the plantations:

"Seedlings planted out: teak, 52,000; blackwood, 3000; 'kurremurda' [Karra marda (*Terminalia tomentosa*)], 1700; 'erol' [*Xylia dolabriformis*], 3000; all these, as well as the older plantations, are breaking into leaf from the early showers this year, and are now looking extremely well."

The following is the detail of the operations carried out during the year at Nilumbur:

"52 acres planted with 52,000 teak seedlings; 10 acres planted with 10,000 blackwood seedlings and other jungle wood seedlings; 2300 acres of plantation weeded; 590 acres pruned; 70 acres of site for fresh planting prepared; 600 logs of teak and jungle wood felled; 240 logs dragged into forest

depot ; 904 logs floated to coast depot ; 5457 saplings floated to coast depot ; and 3082 bamboos."

Some of the oldest areas in these plantations now consisted of fine young pole crops of twenty-four years in age—Conolly having commenced the work, it will be remembered, in 1844.

Another interesting plantation experiment which had been started was connected with the Red Sanders-wood (*Pterocarpus santalinus*). This tree at the time was said to have a singularly local distribution, "being only found in quantity on the gravelly slopes of the rocky hills in North Arcot, Cuddapah and the southern parts of Kurnool." It was comparatively rare in the first of these districts. The Conservator visited the plantation commenced in Cuddapah in October, 1867, and reported on it to Government. The plantation, a small one, was the first successful attempt to cultivate the red sanders-wood of commerce, and so far no regular establishment had been sanctioned for the work. The following is an interesting extract from the Conservator's Report :

"*First Attempts Unsuccessful*.—Some years ago two officers of the Forest Department made various attempts to raise the red sanders in the Cuddapah district, but there was no result ; the curious flat-winged seed appears to have been planted too deep. Mr. Yarde has succeeded, by watching the process of nature. The seeds are washed down in the north-east monsoon, and are partially covered with sand in the rocky nullahs.

Uses of the tree.—The stem is valued for house-posts beyond any other, being impervious to white ants. The smaller portions are carved into images, etc. The leaves are the favourite food of cattle and goats, and are much in demand. The wood is extremely hard, finely grained, and of a garnet-red colour, which deepens on exposure. It is employed to dye a permanent reddish brown colour. It communicates a deep red to alcohol and ether, but gives no tinge to water.

Commercial.—In the cold season large heaps of short billets (2 feet to 3 feet), or gnarled roots, may be seen on the Madras beach, where it is sold by weight, and, being heavy, is used as dunnage. In the four years, 1852–53 to 1855–56, the value of this wood exported was Rs.2,20,983, or more than half a lac a year (Madras Exhibition Report, 1857). The North-West line traverses the native *habitat*, and the supply has been diminishing. The seigniorage in Cuddapah was raised from Rs.1 to Rs.6 per cart-load, to prevent its extermination. As

the value of a post is not less than Rs.2½, and there are often 20 in a cart, the value of the cart-load is often Rs.50. Price of the roots keeps steadily at £3 10s., sometimes £4, per ton.

Site of Plantation.—The plantation is about a quarter of a mile east from the Codoor Railway Station, and may be seen from the line. The land was formerly covered with fair scrub jungle, and is watered by a 'picotta' from the Codoor River, the banks of which are undulating, and the soil gravelly, with an admixture of red earth and sand. The extent is 24 'cawnies' (say, 30 acres); half of this is now planted. The whole is being encircled with a bank 3 feet high, and topped with an aloe fence.

System pursued.—The seeds are gathered in May, and sown in July in small beds, about 8 feet square, prepared on the river bank. They are thrust into the light soil perpendicularly, or at an inclination, and about one inch deep, just sufficient to cover the winged seed. About 700 seeds are put in the bed, which is watered every second evening by a watering can. Seeds soaked one night in cold water germinate in 20 to 25 days, and unsoaked seeds in 30 to 35 days. After germination has taken place the beds are moderately watered by a 'picotta,' small channels communicating between the beds. During the first six months particular care in watering is necessary; Mr. Yarde 'finds that too much water is equally as destructive as none at all.' The condition of the soil will be the best guide. The plant inhabits a country with small rainfall. The leading shoot at six months has a tendency to droop from the weight of the leaves, and should be supported with a forked stick, which is sufficient to straighten the stem.

Planting out.—It is convenient now if rain falls to transplant from the nursery into wicker baskets, supplied at a very low cost, six 'pies' each by the Yanadies, who are skilful in digging up with care the long tap roots with a pointed instrument. The baskets should be watered every second or third day, and kept in the shade. When the plants are 15 to 20 inches above ground, and well rooted, the baskets should be buried in holes 1 foot by 1 foot by 2 feet, at 7 feet apart; they must be watered moderately till the rainy season.

Present Condition and Prospects.—There are now 8000 promising plants, of various heights, from 1 to 3½ feet. The number would have been larger, but the want of rain for two years prevented planting out, and caused about 2000

casualties. In November, 1865, a sudden rise in the river destroyed a number of nursery beds."

The experiment had been carried on for two and a half years, the nursery being close to the forest Officer's head-quarters, and the total cost worked out to $1\frac{1}{2}$ annas per plant raised, which numbered 8000. In view of the results attained a small establishment to cost Rs.300 per annum was asked for and sanctioned by Government.

Some progress had been made with plantation work generally during the period. In addition to the Nilgiri and Wellington Plantations in the hills, there were others in the Wynaad, Madura and Golconda districts, and the casuarina plantations on the coast already mentioned. Many demands for seed were made, and the Horticultural Society was asked to give assistance in this matter in the case of exotic seeds. Eucalyptus and wattles were being requisitioned on a considerable scale for the Nilgiri plantations. Mahogany was being tried in several parts, the seed being indented for from Honduras, whilst it was thought that the *Pinus maritima*, which was giving such successful results on the sands in the Landes on the west coast of France, might prove successful on the east coast of Madras, and seed was obtained through the Secretary of State for trial.

The Gumsur sâl forests in the northern part of the Presidency have already been alluded to in a previous part (I, p. 323). Cleghorn had visited these forests and had expressed a hope that it would be possible to work them. An enquiry was carried out on this matter, the Ordnance, Public Works and railway officers being referred to. None of these Departments were over sanguine of being able to utilise the sâl from these forests owing to their at present inaccessible condition. In a Despatch (R.F., No. 8, dated 12th October, 1867) the Madras Government wrote to the Secretary of State to this effect, saying:

"It is evident from the papers that the demand for sâl timber from the Northern Districts has to be created; but we see no reason to doubt that when large scantlings of this fine timber are available on the coast, a remunerative demand will spring up.

To facilitate the transport of the scantlings, the Conservator now proposes to provide four strong timber carts with buffaloes, at a total cost of Rs.480, instead of maintaining an establishment of elephants, which would entail

too much expense, and the suggestion made in your Despatch under reply for the introduction of sawyers into the forests will also be kept steadily in view. We have approved the Conservator's proceedings."

The early months of 1866 were said to have been exceptionally hot and an unprecedented drought was experienced. Fires were to be seen burning on every hill. A serious one burnt out a part of Deva Shola and 60-70 "cawnies" of felled timber, which had been destined for the Lawrence Asylum works. The Nilgiri sholas had, by the way, been transferred from the charge of the Forest Department and placed under the management of the Revenue officials. A more serious fire occurred in the Anaimalai Forests at the head of the timber slip (vide Vol. I, p. 224). Beddome, Deputy Conservator in charge of this division at the time, had a hand in putting this out, and the Conservator in a subsequent Report on this fire to Government wrote as follows :

"Extent of Loss.—The actual loss of timber burnt is about Rs.6,000 ; the estimated value of the wood, after transport to the coast, would be about Rs.18,000.

Origin of Fire.—About four or five days before the fire was discovered, several Chettys went through the forest to purchase cardamoms from the Kadirs. it is supposed that in cooking food the long grass was carelessly set fire to, which spread through the whole forest.

Jungle Fires.—Fires originating from lightning, carelessness, wilful burning to improve pasturage, or, more rarely, from the friction of bamboos, sweep over the hill-sides every year, and great precautions are necessary to prevent loss by combustion of forest. It has been the custom to clear, with great trouble and considerable expense, round the timber depots and outlying logs. The Duffadar states that efforts had been previously made and money spent in clearing the brushwood, but Captain Beddome reports that the stack had been again choked by teak-leaves blown on by the high winds.

Natural Causes.—It appears to me certain, after consulting the Collector of the district and the Inspector-General of Police, that the fire arose from natural causes, and that the exceptional circumstances of the season favoured the conflagration. Fires have been unusually prevalent all over the hills, extending to parts difficult of access, as Hoolikuldroog and Lambton's Peak.

Extraordinary Drought.—In my previous visits to the Anaimalai Hills, I never witnessed such excessive drought as this season. At Oodoomalpettah there is a great scarcity of drinking water, and at Polachy it was only at an early hour that bathing water was procurable. The fire was extinguished by digging pits in the channels of the mountain streams.

Conclusion.—The abolition of the Indian Navy, and the long period which elapsed before the Lords of the Admiralty decided not to take the Anaimalai timber, except at unremunerative rates, led to the forest being overstocked.

It seems most important to devote our energies to clear this rented forest of the large stock of timber now on hand, and in future not to fell beyond two or three years' consumption.

It also appears that, in unfrequented forests, planks and logs are much less liable to injury by fire when detached than when piled into a stack; this practice shall be forbidden by Circular from the Office, except on banks of rivers where water is procurable and space valuable."

In 1867, owing to the decrease in elephants and the increasing price of these animals, it was suggested (by Beddome apparently) that an elephant-breeding depot should be started in the Anaimalais. In support of the suggestion the Acting Commissary-General, Madras, wrote that "in Burma it is no uncommon occurrence for elephants in the tame state to breed. Of those animals purchased in that country, and sent to this Presidency in 1858 and 1859, several females dropped calves. To the best of my recollection, one was born on board ship, one at Masulipatam and three or four after the lot arrived at Hoonsoor. The subject of rearing these young ones then occupied my attention and I made an estimate of the probable cost, which, even at Hoonsoor, where abundance of excellent forage is procurable gratis, so far exceeded the usual prices then paid that the project was abandoned. I believe it to be perfectly feasible, and have reason to think, that elephants so reared will be found to be harder and work better than animals captured in the jungles. The question, therefore, is one of expense only, and if Captain Beddome can hold out any hopes of rearing animals to a size fit for the Service for a reasonable sum his suggestion is deserving of an early trial."

The Government of India did not approve of the suggestion, thinking it would be a very expensive one. If, as was held, the Madras elephant was better than the one from Ceylon for

working purposes in the forests and elsewhere, they should set to work to catch them in Madras as was done in Bengal.

As regards the advice tendered by some of the Collectors and officials in Madras on the subject of the decrease in numbers of the wild elephants and the necessity of legislation to protect them from being shot, the Government of India said they would be prepared to support Madras in this connection. As an outcome a rule, which was badly needed, was ultimately brought in prohibiting the shooting of elephants, unless any beast had been specially proscribed. This rule was made applicable to Mysore and other parts, but not to Travancore. In the correspondence on the subject we find a Collector of Malabar stating that persons had actually taken to elephant shooting in these forests as a livelihood. This he was able to stop—but it proves the extent to which the animals were being persecuted at the time in what, for such an animal, was a comparatively narrow range of country. There can be little doubt that but for the wise rule ordering their protection they would have been exterminated. As the Secretary of State correctly remarked: "The correspondence now forwarded seems to show the necessity of legislative measures being taken to prevent the destruction of these valuable animals, which has been going on with great rapidity for some years."

It will be remembered that Cleghorn had visited the Ootacamund Hills and "sholas" and had drawn up recommendations for their management and for planting work to be undertaken in 1859 (I, 307). The management then introduced had worked well for some time. But with the grant of shola lands all round Ootacamund for cinchona and tea cultivation the Forestry Department experienced considerable trouble in managing the shola forests. Cinchona plants and seed were first brought to India by Sir Clements Markham from Peru in 1860. The trees died, but the seed was sown and the plants put out in the Nilgiri Hills. In 1867 Cleghorn himself proposed to give up the shola areas to the care of the Commissioner in charge of the hills. In the following year the Officiating Conservator (Beddome) wrote as follows:

"When Forest Conservancy was first introduced at Ootacamund, it worked well, all, or nearly all, the 'sholas' belonging to Government, and there was very little attempt at smuggling, as all wood could be seized if entering without a pass; our receipts were comparatively large, and the Depart-



CORNER OF A GARDEN AT TABDAH, NEAR MUNPOO, GOVERNMENT CINCHONA PLANTATION,
DARJILING, DISTRICT, BENGAL, ELEVATION 3000 FEET. MUNPOO PEAK IS SEEN IN THE
MIDDLE DISTANCE. BAMBOOS, CYPRESS, AND TREE FERNS IN FOREGROUND.

Photo made by F. W. C. on 11. 11. 1904.

ment could well pay its expenses. Within the last few years, however, large quantities of 'sholah' land all round Ootacamund have been given up for cinchona and tea plantations, and wood has been brought from all quarters, and it has become impossible to stop any wood, although it may have been clandestinely cut, unless parties had actually been detected felling it in Government tracts. Our receipts were reduced to a minimum, and it became impossible to check smuggling without a large establishment of Forest Police, which the revenue did not authorise. Smuggling is, however, confined to headloads, and the real cause in the falling off of the revenue has been the large amount of wood brought into cantonment from the plantations alluded to.

This private supply of wood from the different plantations will fail shortly, and the revenue from the Government 'sholas' will consequently increase, and will authorise a larger establishment. I may also mention that private planting has lately received a great stimulus, and many residents can supply their own wants from their private grounds, and even sell wood. I do not, therefore, feel the alarm as to the future that is expressed by the Commissioner.

I believe it would be the best plan to transfer the conservancy of all the 'sholahs' entirely to the Commissioner and his assistant, relieving the Forest Department of all duties except that of superintending the planting. Whether an officer is appointed or not to this charge, under the Commissioner, the smuggling cannot be checked without a large staff of Forest Police, which will be a heavy charge of itself, but an officer could hardly be employed on a smaller salary than Rs.500 a month, and how is the charge to be met? If it is put on the wood (a necessity of life in a place like Ootacamund) it will cause great dissatisfaction to the residents and visitors to the station. Government will remember that an officer was formerly appointed solely to this charge, but the appointment was soon done away with on the ground of expense, and I could not now recommend the employment of an officer, when I feel sure that an active overseer of character and integrity is fully equal to the charge, if he has a sufficient staff of police under him."

In an Order dated 11th March, 1869, the Government, after reviewing all the correspondence, sanctioned the transfer of the existing forest establishment on the Nilgiris to the Commissioner from the 1st April, with the warning to him that he

"should bear in mind that as a rule the annual cost must not exceed the annual receipts, as the charges and collections for the future appear in the accounts under 'Jungle Conservancy' subordinate to local fund."

The transfer was doubtless unavoidable at the time owing to the paucity of staff of the Forestry Department; but the necessity of such a retrogressive step was on a par with the lack of vision and statesmanship on the part of the Madras Board of Revenue in dealing with forest matters. By 1870 they had lost the pride of place which they should have occupied in India in this matter. The position at this period is well summed up by the Secretary of State in a review of the Forest Report of the Presidency for 1869-70, which was only forwarded to him on 9th May, 1871, although dated June 1st, 1870. This Report is of high interest, since it details at considerable length the various branches of work on which the Department was engaged in the several districts and also exhibits the mistakes which were being made and the difficulties, which lack of co-operation and assistance, were putting on the new Department. The Secretary of State's (Duke of Argyll) Despatch is a good summary of the position. He wrote:

"The financial results show a net profit of £20,909, with stock in hand valued at £44,090, less by £11,813 than what was in hand at the close of the previous year. Major Beddome contends that this should not be deducted from the profit of the year, but this cannot be admitted as a sound principle, since the stock sold was obtained in the previous year, and the cost of obtaining it charged against that year, and the surplus has only been gained by the diminution of so much valuable property belonging to Government. The other reason adduced by Major Beddome, the incorrectness of the valuations, must be remedied by making them correctly in future." This deduction reduces the actual profit of the year to £9,096. Comparing, however, the cash transactions of this year with 1868-9, the charges had increased by £1,699 and the revenue by £10,461, showing an improvement in the cash transactions of 1869-70 of £8,762. Your order gives an abstract of the quantity of material drawn out of the forests by these operations, and I agree with Your Excellency in Council that these results testify favourably to the work of the Department. An analysis of the statement, on page 42 of the Report, show that in six of the divisions given the expenditure had exceeded

The revenue, but the transactions of the 1st are new and insignificant; those in the 3rd, 4th and 6th relate chiefly to plantations; and in Wynaad there had been a considerable increase of profit from 1868-9, although the confidence of the merchants was said to be still impaired by Mr. Turnbull's frauds. In Madura the assigned causes for the loss are more serious, 'the poverty of the forests,' and 'the paucity and want of organisation of establishments.' There had, however, been expenditure of an extraordinary kind, and the credit side had been reduced by the stoppage of felling, and by extensive free grants of timber to ryots and villages.

It is satisfactory to perceive that considerable progress has been made, and is being carried on in the formation of plantations and fuel reserves of various kinds. These are not only in themselves interesting experiments, but most important to the well-being of the country, as a means of keeping up the supply of timber and firewood, the demand for which has increased enormously, and is not likely to be diminished.

But whilst I give credit to the Administration on these grounds, it is evident, from the documents before me, that much more might be made out of the fine forests of your Presidency; and that of late years sound principles of conservancy have not made the progress which they should have done from the earlier start which they had here over the rest of India. The establishments are clearly not large enough for the increased duties devolving upon them in their several charges, and this weakness has been augmented by the unfortunate illness of several of the most energetic and able officers in charge of districts. Captain Gosling, Lieutenant Walker and Mr. Cadell have all been driven home by ill-health. Moreover, questions affecting the definition of the rights of the Government and those of 'zemindars' and 'ryots,' whether to timber and fuel or to the minor forest produce, are still unsettled; no progress has been made towards any legislative enactment, and there is an evident want of the cordial support which might be given by the Revenue officers to those of the Forest Department. This is a point which I regret to have to refer to again; as the effects of such a defect of cordiality in the cession of forest lands were noticed with regret by my predecessor and myself, in the Despatches, dated respectively 23rd July, 1868, No. 9, and the 11th February, 1869, No. 1. It is not possible that such want of co-operation should not be observed and taken advantage of, and that it should not

greatly increase the difficulties of the Forest Officers. Of course this want of cordiality is chiefly displayed by the native subordinate officers, but Collectors should be warned to watch for and repress any such feelings in their establishments.

Your Excellency in Council has noticed another most important evidence of this want of progress in conservancy, in the very small extent of forest which is worked departmentally ; and I entirely approve your instructions to the Conservator and his deputies not to intermit their efforts to put a speedy end to the license and voucher system which, you justly observe, is fraught with facilities for fraud and oppression. But the chief remedy for all these difficulties in the way of sound conservancy will probably be found in the demarcation of forests, and the introduction of an Act conferring the necessary legislative powers. Without the former of these steps, the Government property can with difficulty be protected, and the difficulties in the way of permanent conservancy are greatly increased. It is a step in the right direction to obtain, wherever possible, the management of private forests. This has been done in some instances, I observe, and is to be done whenever forests fall under the Court of Wards.

In my Despatch of the 17th of March, 1870, No. 4, I directed attention to the question of the preservation and collection of the minor produce of the forests, and these papers impress me still more with its importance and the necessity of its being carefully considered by Your Excellency in Council. Major Beddome's remarks go to show that the present system confers no real benefit on the Hill tribes, while valuable produce is wasted, and the Government loses annually very large sums of money to which it has a legitimate right. The system, too, must, as represented by the Forest Officers, be destructive of conservancy. It is, as Major Beddome remarks, an anomaly to talk of Reserved Forests, if anyone can enter into them to collect what they call Hill produce. There is no desire, as it seems to me, on the part of the Forest Officers to deprive Hill-men of their earnings in the way of collecting these valuable products. On the contrary, they desire to protect and employ them. By degrees, this intercourse would bring them to more civilised habits and methods of cultivation, a considerable revenue will be added to the Government resources, and such valuable products as cardamoms would be made the most of. With a cordial spirit of co-operation between the Revenue and Forest Officers, I see no reason

alleged why these benefits should not be obtained, and the collection of these articles placed on a footing satisfactory to the Government and the people.

In a similar manner the rights of the Government and of private persons and communities might be arranged.

I observe that in two of the ablest Reports of the subordinate officers, those of Captain Gosling and Lieutenant Walker, attention is called to the waste occasioned by rude methods of felling, and it is suggested that saw machinery might be introduced with much advantage into the forests. This point has been also urged in this country by Captain Gosling, who, notwithstanding his severe illness, has inspected machinery of this kind. It is very creditable to him, to Lieutenant Walker and to Mr. Cadell, that they should have employed a part of their furlough in studying matters connected with their profession, both in England and on the Continent, according to the rules laid down for that purpose.

Mr. Cherry points out the want of shelter for the people employed in the Wynaad Forests, and proposes the erection of forest huts. My predecessor, in his Despatch of the 31st of August, No. 5, of 1867, informed your Government that it was 'no less the duty than the interest of Government to take the best measures in their power for preserving the health of those who are exposed to the effects of unhealthy localities in the forests.' One of the most effective means of doing this is by the provision of shelter. And expenditure on this object was commended in Sir Charles Wood's Despatch to the Government of India, dated 9th November, 1861, No. 27.

I have considered, at more than usual length, the features of the documents before me, because important principles of conservancy are involved, and it is clear, from Major Beddome's remarks, that the Department is not, in many ways, in a satisfactory position.

I rely on the continued exertions of Your Excellency in Council to remedy these defects, and to assist the Forest Officers in their difficult task of administering the forests on a sound system of permanent conservancy."

MYSORE AND COORG

Allusion has been made to the inauguration of a separate Forest Department in Mysore, including Coorg, in 1864 (I, p. 323). The officers appointed to the Department were Major Hunter as Conservator and Lieutenants Van Someren

and Miller, Assistant Conservators. These officers spent the year in making themselves acquainted with their charges, in drafting new rules for the protection of the forests and inaugurating office procedure. Consequently little conservancy work was undertaken during the year.

The Mysore Forests were divided into three charges based upon the civil divisions of the country. These charges were the Ashtagram, Nuggur and the Nundidroog Divisions. The work carried out had been confined to inspecting and reporting on the areas and setting aside certain portions as reserved forests, the preparation of tabular statements and maps where possible, the inspection of all lands applied for by coffee planters, and in checking the felling of immature timber.

In January, 1867, the Officiating Conservator, Van Someren (Hunter was on leave), in his Annual Report for 1865-6 wrote as follows with general reference to the condition of the forests :

“ Taking into consideration that three years have not yet elapsed since the nomination of a Conservator, that the Department can be said to have had but two clear working years, and that only one year has elapsed since the appointment of the Assistant to the 3rd range (Nundidroog), these results I trust will be considered good. It should also be borne in mind that the Department in Mysore labours under a disadvantage from which the other Forest Departments are exempt. The revenue derived for many years from the great timber tracts in the south of the Ashtagram Range was very large. The forests were worked in the most reckless and wasteful manner, no regard being paid to the maturity or otherwise of trees felled for timber. The supply was therefore equal to the demand in quantity, if not in quality. This system has produced its natural results, and the out-turn of the Ashtagram Range will be small for many years to come. When Major Gib, formerly of the Madras Forest Department, handed over the Hoonsoor Forests, measuring 40 square miles, to the Ashtagram Assistant, he estimated the yearly out-turn at 5,000 cubic feet, of which 3,000 only were expected to be sound wood. An approximation to the anticipated yearly yield of the Ashtagram Range will be found in this Report, paragraph 14. The officer in charge of the Nundidroog Range has also reported that the felling in the Kankanhully jungles (the wooded tracts of most importance in this range) has been most

wasteful, that no timber trees are left in the accessible portion of the hills, and that most of this waste took place just before the opening of the Bangalore Railway, when timber was in great demand. The Nuggur Report has no remarks on this subject. The fact, however, of a constantly recurring large revenue (raised without reference to the future) has given rise to an exaggerated and mistaken idea of the forest resources of the Province. Most of the other Forest Departments were commenced in the expectation that the financial results could only exhibit deficits for the first few years after their organisation ; strict conservancy is the great need of a large portion of the forest tracts in Mysore, and while the source of supply is small, large revenues should not be expected."

The above remarks indicate that the reckless methods of felling which had been in force elsewhere in Madras for so many years had been carried on in the Mysore Forests. The following description of the operations during 1865-6 in these divisions exhibits the lines upon which the work of conservancy proceeded :

"Ashtagram Division.—During the year 1865-6, the little-known forest tracts of Bandipoor, Berumbady Poonjoor, Bussan Bettah, Beemaswary Honganoor, Arkulgode, Maharajdroog, Munzerabad, and Bailoor were carefully inspected, and several other portions of the range. Twenty-one out of twenty-four 'talooks' were also visited, with a view to inspecting and mapping out the Sandalwood Ranges. Nineteen jungle tracts applied for by private individuals were inspected ; eleven of these were granted and eight refused, the latter being too rich in timber.

Nuggur Division.—Various portions of this range were visited by the Assistant, and Major Hunter, the Conservator, went through the greater portion of the Western and Central Forests during January and February, 1866. The result of this inspection was submitted to the Commissioner in the Conservator's letter, No. 293, of the 22nd March, 1866. He seems to have considered that in many parts there had been wasteful and careless felling, and draws attention to the rapid denudation of several large tracts of wooded country. No detailed Report of the Assistant's inspections has been received, and the maps of this range have not been sent in.

Nundid-oog Division.—The Toomkoor and Bangalore Districts appear to have been carefully inspected. The

Colar District contains no forests. The maps of this range have not yet been finished. The result of these various inspections and examinations was that large tracts of land were set aside as Government reserved forests, in which, under the power granted in Rule 8 of the Forest Notification, all felling, except by direct Government agency, is forbidden."

On the subject of selecting timber for felling, Van Someren did not believe in the introduction of a general rule that no trees under a certain girth should be felled. He considered that maturity and not size should determine the point, irrespective of size. The seed of old trees, he pointed out, was not so healthy or likely to produce sound timber as that from trees just arriving at or just past maturity, and usually as soon as a tree had passed maturity decomposition commenced to set in in the timber. In the Ashtagram Range he had commenced felling on the principle of a fixed girth limit, but had soon abandoned it. He found the "cooroomburs" (axemen who lived entirely in the forests) to be capital judges of the maturity or otherwise of a tree, and as the supply of teak in that range was limited he thought it better to fell the matured teak irrespective of size.

The expected yield from the forests during 1867 was as follows: Nuggur, 2900 teak logs and poles; Ashtagram, 2400 logs of timber of which 1100 teak, 660 *Pterocarpus marsupium*, 310 *Terminalia tomentosa*, 330 blackwood (or rosewood, *Dalbergia latifolia*); the average size of the logs was estimated at 23 cubic feet all over, teak 20 cubic feet. The teak was to be spared as much as possible and the balance made up with *Nauclea cordifolia* and other "jungle woods"; Nundidroog, 10,000 cubic feet of timber.

Several teak plantations were in existence in the divisions and doing well. A nursery had had to be abandoned in the Kakencottah Jungles (Ashtagram) owing to a plague of rats appearing and entirely destroying the young teak seedlings.

In the other two divisions the Forest Officers had collected large amounts of seed of various species and were prepared to supply amounts to zemindars and others who wished to plant private fuel plantations.

Sandal wood formed a valuable portion of the produce from the forests of Mysore. It was hoped to obtain 400 "candies" of this wood from the Nundidroog Division during 866-7, and other amounts from the Ashtagram Division;

the propagation of this species was to be undertaken in this division by sowing seed in hedgerows and clumps of bushes, these being the conditions in which the tree was commonly found growing.

Cleghorn, officiating Inspector-General of Forests, in his review of the Report gave the following summary on the selection of the Government Reserves :

"There were thirty-two reserved forests, viz.: In the Ashtagram Division, 11; Nuggur Division, 11; Nundidroog Division, 10; total, 32.

The principal sources of timber supply are in the Ashtagram and Nuggur Divisions, near the Western Gháts, and within the influence of the south-west monsoon. The great teak belt, bordering Wynaad, extending from the boundary of Coorg in the north to the Moyar River in the south, is in the Ashtagram Division. The forests in this division, with three exceptions, are definitely marked off by natural boundaries, and with four exceptions contain no villages and no roads through them, except those used by the Forest Department. These are all rich forests, but much devastated. The great markets are Mysore and Bangalore. In the Nuggur Division also are forests containing teak, blackwood, "poon" (*Calophyllum tomentosum*), and sandal. The logs are floated down the Toombuddra to Bellary, and down the Wurdah to Dharwar District.

The reserves have been absolutely reserved for the purposes of conservancy, and steps are being taken for careful mapping, surveying and demarcation. No information is yet given regarding the area or comparative yield of these tracts."

In the review of the Report for 1866-7 the Government of India lay particular stress on the importance of demarcating the Reserves as soon as possible, and that the progress made with the demarcation work should be distinctly shown in each Annual Report. They also stated that it was inadvisable to demarcate a larger area of forests than could be efficiently protected; that the selection of forests in different parts of the country should be based financially on their utility for producing the requirements of the population; and that once selected and demarcated, grazing, fires and all irregular felling should be strictly prohibited within the Reserves. On other waste land, the property of Government, the felling of valuable trees

which was still in practice should be prohibited, and such prohibition should apply to wooded tracts generally until their ownership had been definitely settled, in order to put a stop to the illicit felling and smuggling of timber which was said to be rife, especially across the frontier to Dhawar, where timber was in great request and fetched a high price. It was also decided to create a few sandal wood reserves in the Ash-tagram Division. With reference to the Nundidroog, the Conservator expressed the opinion that the timber trade in that division could not be lucrative, owing to the greater part of the country being open, with a dry climate and a comparatively small extent of "jungle" distributed unequally over it. The Government of India held that it was necessary to demarcate the most promising of these areas as reserves in the interest of the maintenance of the requirements of the population, pointing out that the production of timber was not the only object of forest management. The same remark held good to areas on the eastern side of Madras. Bamboos, small wood for agricultural and domestic purposes, firewood and a variety of other forest produce were necessities of great importance, the consumption of which would go on increasing with the growth of agriculture, industry and the trade of the country. They approved of the proposals to form fuel plantations, for the railway and other purposes, as they considered this to be a work of great importance, and they hoped that every effort would be made to afford the Conservator facilities for obtaining land for these purposes. The fair progress made with the plantations at Coongul (100 acres) and Ouscotta (400 acres) was satisfactory, but these areas would be quite inadequate to meet the requirements of the railway and the country generally. The Conservator had reported that he considered he would be able to undertake the work of increasing the sandal wood area and carry out the plantation operations by means of his staff, and that no skilled, trained agency was necessary. The Government of India did not see how this would be possible, and asked that further consideration should be given to the matter; more especially in view of the fact that it was admitted that the best method of cultivating sandal wood had not yet been ascertained. They also asked whether, in view of the greater amount of sandal wood cut in 1867-8 (2368 candies as against 1665 in 1866-7), there was not some danger that they were overcutting, and directed the Conservator in future Reports to show the quantity of

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required, containing all points and lines that have been accurately determined by the survey.

It is satisfactory to observe that the Chief Commissioner desires to see better progress made in the formation of sandal wood reserves. The demarcation of promising tracts which produce sandal wood, and the increase in them of sandal wood by protection and sowing, are fully as important as the demarcation of timber and wood-producing tracts. In the year under review the sales of sandal wood are reported to have realised : In Nuggur, Rs.74,676; in Ashtagram, Rs.74,672; in Nundidroog, Rs.42,784: total, Rs.1,92,132; or more than one-half of the entire forest revenue. These sandal wood reserves will eventually prove to be most valuable estates."

In 1864-5 1985 "candies" of sandal wood were felled in the forests, in 1867-8 and 1868-9 2370 and 2385 "candies" respectively. In 1869-70 it was proposed to fell 1920 "candies," and in the budget estimate for 1870-1 3200 "candies." On this subject the Government of India wrote: "In his Report which accompanies the Budget for 1870-1, the Conservator proposes a different system of collecting sandal wood, with the object of utilising to a greater extent than has hitherto been done the sandal wood growing in distant localities. This will doubtless be a useful measure, but unless a regular plan of operations is established, by which the localities and the extent of each year's cuttings are regulated, it will be impossible to know whether the present consumption is not in excess of the annual production. The high prices which have of late been realised in some districts doubtless are a great temptation; but the production of sandal wood is limited to a small part of India, and its consumption will certainly not diminish; prices, therefore, are likely to rise further, and this is an additional reason for so regulating the supply as to secure its permanency."

The Government of India's knowledge of the position in Mysore was the outcome of a visit by Brandis to the forests in 1869. Commenting upon their remarks the Secretary of State wrote (R.F., No. 10, dated 24th March, 1870): "These results would, in all probability, have been greater had the Department been more adequately organised, and I am glad to observe that you have determined to apply some of the surplus obtained to placing the Department on an efficient footing. It is at all times important not to obstruct measures

of conservancy by withholding the means of efficient administration, and it is, as you say, very desirable to seize the opportunity of promoting systematic forest management in Native States."

It will be remembered that Mysore, though at the time under the management of the Government of India, was still regarded as a Native State which would ultimately be restored to its Chief.

As an outcome of the remarks made upon the formation of reserves in the Nundidroog Division already referred to, Van Someren, who had been confirmed as Conservator in 1868, wrote a special Report on the division in 1869, giving a clear account of the resources in respect of timber, bamboos and firewood of the three districts of the division, Kolar, Bangalore and Toomkur. This Report confirmed the expression of opinion of the Government of India on these forests that though poor in character they were of great value in this dry and comparatively barren part of the country, and therefore required to be carefully husbanded, the most promising forests being demarcated as State forests. The Government of India requested, therefore, that their previous suggestions with reference to these forests should be carried out. Brandis had advised the formation of village forests. The Chief Commissioner of Mysore did not consider this practicable; he was therefore directed to include a larger area of jungle land within the limits of the State forests than would have otherwise been necessary.

The Conservator gave the following list of products existing in these forests :

" These are lac, ' dindiga ' (*Anogeissus latifolia*), gum, gallnuts from the alale and géru (*Terminalia chebula* and *Semicarpus anacardium*), ' koppila rung ' (*Mallotus philippinensis*), scarce; ' puplie ' bark which produces a red dye; the bark of the *Acacia leucophlea*, used for distilling arrack; bark of the *Cassia auriculata*, used in tanning; ' dupa ' gum (*Vateria indica*), scarce; ' hoinge ' (*Bongamia glabra*), pods from which oil is extracted; ' hippe ' (*Bassia longifolia*), from the seeds of which oil is made; the flowers do not appear to be used as in other parts of India, for making an intoxicating liquor; ' bel ' fruit (*Egle marmelos*); wild castor oil, very abundant about Closepete and Chennapatna, and common all over the division; wax and honey. The fibres of the *Calotropis gigantea* are sometimes used for

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rather than make them over to the new Department, in direct opposition to existing orders. Realising that matters were in an unsatisfactory state the Revenue Commissioner, Northern Division, had issued a circular order on this subject in October, 1862. It was the neglect of the provisions of this order which had drawn a strong remonstrance from the Conservator of Forests, Dalzell, which resulted in the enquiry being instituted. It transpired that nominally no area containing trees of any kind on it should be disposed of by the Settlement Officer until the local Forest Officer had inspected it and expressed an opinion as to whether it should be retained as forest, if sufficiently valuable for the purpose. In many cases this procedure was carried out. But in numerous other instances the reverse was the case; and the irregularities in the procedure thus adopted were to give rise to great difficulties and trouble in years to come.

Complaints had been made in connection with the expense of demarcating the forests, especially with the work of erecting permanent pillars on the boundaries. With reference to the progress of this work and the methods on which it was being carried out a resolution of the Government of Bombay (R.D., No. 4345, dated Bombay Castle, 23rd November, 1866) affords information of considerable interest :

“ The progress made in the demarcation of the Imperial Forest Reserves in Tanna may, under the circumstances explained by Captain Lloyd, be viewed as satisfactory. Eighty-seven thousand nine hundred and forty-two acres of forest, spread through five ‘ talooks,’ have been marked off at an expense of Rs.2,575, from which it appears that the average cost of demarcation per acre, including the cost of supervision, is 5 annas 6 pies only. For the economy of this result the Government are indebted to the judicious arrangements of Captain Lloyd.

All cultivation in Sonderwadee, and on the slopes of Matheran, should be prohibited. Captain Lloyd should arrange for the removal of the ‘ Thakoors ’ now cultivating on these spots to the villages he indicates, or to other convenient localities. Their claims should be treated with the greatest consideration; and, if necessary, sufficient sums of money should be given to them to enable them to build new huts. All expenditure under this head should be defrayed by the Forest Department. Captain Lloyd, whose interesting Report shows

he possesses remarkable aptitude for the duty, should be requested to personally superintend it next season.

The management of village reserves presents many difficulties. To leave them unprotected would, in the opinion of most authorities, be equivalent to abandoning them to speedy destruction. To keep them under regular surveillance is impossible, owing to the expense.

To ensure that the village reserves shall not be speedily denuded of all valuable timber, it would appear that one of two courses must be adopted. Either certain kinds of superior timber must remain the property of Government, or the law must prohibit, under penalties, the exportation, for sale, of timber grown in these reserves. Until the introduction of a Forest Act into this Presidency, the latter alternative is practically denied to Government. In the meantime the former may be experimentally adopted for one season in all the 'talooks.'

Major Francis' proposal to set apart tracts for 'gowlees,' in which they should be permitted to graze their cattle unmolested, is sanctioned; and the officers engaged on demarcation should be desired to select the tracts.

The Warlees, Katkurees, and other hill tribes, are more difficult to deal with. Major Francis is in a position to offer much valuable information regarding them, and Government would wish to be favoured with any definite proposals he may wish to bring forward before passing orders on this point.

The difficulty anticipated by Captain Lloyd regarding the access to forest springs, which will be hindered by the closing of the Imperial reserves, will best be met as it arises in each case. It is impossible to lay down a rule which shall be universally applicable; but it must be understood that no one should be prohibited from drawing water obtainable in a forest reserve in cases where it is not procurable elsewhere within a reasonable distance.

The Collector of Tanna has suggested that a broad path should be cleared between the marks which define the boundaries of the reserves, and considers that the sale of the wood would more than pay the expense of clearing every year. The Survey Commissioner and the Conservator of Forests should give practical effect to the suggestion."

The allusion to the difficulty of managing the village forests is of interest. It was to remain a problem for many years and



THE TOO GOOD CLEARED FIRE LINE SEPARATING THE
BRITISH AND BARODA STATE FORESTS, BOMBAY
Reproduced from "The Indian Forester" Vol. XXV



THE CLEARED FIRE LINE BETWEEN THE FOREST
AND VILLAGES LANDS, BOMBAY. THE FIRE OF
STONES IS A CHEAP FORM OF BOUNDARY MARK
*Photograph by L. H. Hodgson.
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a real stumbling-block to progress in the Forest Department. As in Madras, the Government of Bombay were unwilling to face this question; but, unlike the former, they were considering the advisability of introducing a Forest Act, as the only possible way to ensure a correct system of Forest Conservancy. The pay of the subordinate establishment, especially of the 'peons,' was scandalously low. The fact that these men took bribes in order to be able to exist at all was constantly brought up against the Forest Department as proving its iniquities and uselessness. To pay the men better was said to be impossible. This attitude persisted for a considerable period. As in the case of the sister Presidency, the incubus of the previous sixty years' mismanagement of the forests appears to have induced a form of paralysis of the mind when forest matters came up for consideration. There were brilliant exceptions, although often in these cases the Collectors wished to be left to run the forests and their ideas upon the introduction of conservancy on their own lines. It will be remembered that Ashburner, Collector of Khandeish, had in 1863 expressed the opinion that forest reserves could be advantageously made in Khandeish (I, p. 352), but he did not wish the forest rules to be applied to the Collectorate! The Secretary of State was unable to support the Collector. Ashburner was really interested in the subject, and in 1867 in a Despatch of the Secretary of State we read: "I notice with satisfaction the commendable zeal of Mr. Ashburner, the Collector of Khandeish, in devising measures for the reclothing of that district with trees. This subject was specially commended to your notice as one of considerable importance by the late Secretary of State, Sir Charles Wood (particularly in his Despatches of 31st December, 1862, No. 41, paragraph 4, and 15th August, No. 59, 1864), and its importance is becoming daily more evident. I shall rejoice, therefore, if the measure which you have now sanctioned affords sufficient encouragement to the ryots to induce them to plant trees of the description for which rewards are to be offered. You will not fail to inform me whether this measure has the desired effect of interesting the people of the district generally in the growth of timber and firewood."

The financial position of the Forest Department had been growing worse year by year and was so bad that the Conservator, Dalzell, at the end of his Report for 1866-7, considered a change of system and reduction in establishment necessary,

and suggested the appointment of a committee to "consider and discuss the present financial condition of the Department, the system now pursued and the changes which seem necessary."

The estimated receipts as per Budget accounts for the year 1866-7 were : receipts 11 lacs of rupees with a net revenue of 4 lacs. The actual receipts of the year amounted to Rs.5,68,946 only (being a decrease of Rs.1,61,401 compared with the previous year), and the expenditure to Rs.5,00,701, giving a total net revenue of Rs.68,244 only, the smallest on record. Canara and Khandeish gave the best results. Dalzell wished to revert to the licence system and give up departmental working.

The reason why Khandeish headed the list of Collectorates, he said, with receipts of upwards of Rs.50,000 (Canara had a net revenue of over a lac) had nothing to do with the forest resources of the Collectorate itself, nearly half of their so-called forest revenue being transit duties paid on foreign wood crossing the district. He did not know under what regulations these fees were levied, and he considered that the whole subject of fees on foreign produce required revision. The remainder of the receipts were fees collected from the Bheels, who were permitted, for the sake of a livelihood, to cut small teak and bamboos, and to trade with the same (*vide* I, p. 352). "The secret," said the Conservator, "of the success in Khandeish is simply owing to no attempt being made at departmental cutting, as well as to the fact that Government owns all the forest produce and the ryots none." Dalzell, although not a fully trained Forest Officer, was a practical man, as his management of the Sind Forests had well shown, resulting in his selection to fill the important Bombay Conservatorship. His pronouncement against departmental working of the forests on a wholesale scale is noteworthy. It was leading to failure in Bombay (although there were other reasons in this case) and in the course of this history other instances will come up for record and consideration. That it is the duty of the State to undertake operations in the interests of the community on a commercial scale in order to show that they are capable of paying their way is unquestionable. But for the State to enter into competition with the commercial experts is of doubtful wisdom. In the case of commercial forestry it is doubtful if any instance of ultimate and unquestioned financial success is on record. Nor do any short-lived exceptional circumstances

a real stumbling-block to progress in the Forest Department. As in Madras, the Government of Bombay were unwilling to face this question; but, unlike the former, they were considering the advisability of introducing a Forest Act, as the only possible way to ensure a correct system of Forest Conservancy. The pay of the subordinate establishment, especially of the 'peons,' was scandalously low. The fact that these men took bribes in order to be able to exist at all was constantly brought up against the Forest Department as proving its iniquities and uselessness. To pay the men better was said to be impossible. This attitude persisted for a considerable period. As in the case of the sister Presidency, the incubus of the previous sixty years' mismanagement of the forests appears to have induced a form of paralysis of the mind when forest matters came up for consideration. There were brilliant exceptions, although often in these cases the Collectors wished to be left to run the forests and their ideas upon the introduction of conservancy on their own lines. It will be remembered that Ashburner, Collector of Khandeish, had in 1863 expressed the opinion that forest reserves could be advantageously made in Khandeish (I, p. 352), but he did not wish the forest rules to be applied to the Collectorate! The Secretary of State was unable to support the Collector. Ashburner was really interested in the subject, and in 1867 in a Despatch of the Secretary of State we read: "I notice with satisfaction the commendable zeal of Mr. Ashburner, the Collector of Khandeish, in devising measures for the reclothing of that district with trees. This subject was specially commended to your notice as one of considerable importance by the late Secretary of State, Sir Charles Wood (particularly in his Despatches of 31st December, 1862, No. 41, paragraph 4, and 15th August, No. 59, 1864), and its importance is becoming daily more evident. I shall rejoice, therefore, if the measure which you have now sanctioned affords sufficient encouragement to the ryots to induce them to plant trees of the description for which rewards are to be offered. You will not fail to inform me whether this measure has the desired effect of interesting the people of the district generally in the growth of timber and firewood."

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teak plantations, twelve having been formed with varying success during the past four years. These were situated in the Tanna, Rutnagherry, Belgaum, Dharwar and Canara Collectorates. The Conservator said that the Murdy plantations on the banks of the Kalanuddi (Karwar taluk, Canara) "excels all the rest both in success and economy. It is to be regretted that any should have been made in confined situations, where they cannot be extended. Plantations are of no use unless conducted on a large scale, and they will always be unremunerative if not made upon really good soil."

Demarcation work had been concluded in the Satara Collectorate and was being continued in the Rutnagherry Collectorate and in the Colaba sub-Collectorate.

The Bombay Government, in reviewing the Report, pointed out that the existing commercial depression affected the timber trade of Bombay in common with all other branches of industry, and therefore reacted upon the forest revenue. At the same time they ordered an enquiry into the existing state of affairs. They pointed out that had the increase in expenditure been due to the formation of plantations, which work for the most part had been neglected, or to increased road building in the forests, it would have been justified. But no such reasons could be given. Collectors were ordered to give detailed explanations for their districts. The Secretary of State was particularly alarmed on the score of the absence of progress in the formation of plantations. He pointed to the growing requirements of the railways which, as in Madras and elsewhere in the country, were now beginning to make their requirements felt. On this subject the Secretary of State's (Stafford Northcote) Despatch No. 51, dated 31st October, 1867, is instructive :

"My own attention has just now been directly called to the high price of fuel, and the difficulty of obtaining it at all in your Presidency, by the accompanying copy of a letter (28th September, 1867, No. 1403) and its enclosures from the agent of the Bombay, Baroda and Central India Railway Company. You will perceive that application is made on behalf of the Company, that plantations should be made for their special use, and the proceeds sold to them at a lower rate than they can at present purchase fuel.

The Despatches of my predecessors, Earl de Grey and Ripon and Viscount Cranborne, to the Governor-General of

India in Council, in this Department (28th February, No. 8, 1866, and 7th December, No. 72, 1866) were communicated to your Government, and a prompt enquiry on the former Despatch instituted by you. The result of that enquiry, as reported in your Resolution of 20th October, 1866, was not, I regret to perceive, satisfactory. But little seems to have been done to increase the future supply of fuel, while the wants of the community, including the railway companies, have greatly increased, and although, as Lord de Grey and Ripon reminded His Excellency the Governor-General in Council in his Despatch above referred to, the railway and other companies employing steam can claim no exclusive right to supplies from the Forest Department, and the market must be considered equally open to the rest of the community as to them; nevertheless, it is most important that provision should be made for all, and, therefore, that it should be borne in mind how largely the railways have increased, and how surely they will still farther increase, the demand for fuel, especially in a country where the cost of coal is so great as it is in your Presidency.

You will perceive that the Locomotive Superintendent estimates that, in consequence of the resolution of the Company to abandon the use of sea-borne coal and to alter their engines so as to burn wood, they will require 100,000 tons of firewood annually, and that to meet this demand they themselves have only plantations of 800 and 900 acres in extent, whereas they reckon that it will take 8000 acres (at 500 cubic feet per acre per annum) to produce that quantity.

I fear that, in the present state of the forest reserves throughout your Presidency, there would not be found means for providing such a large supply, in addition to the wants of the public. I need not say that I should be most reluctant that your Government should interfere in any way with private enterprise; but, for an object the profitable returns from which are not at first sight obvious, and at all times are slow in coming, private enterprise is not, I fear, likely to step in for some time, and when it does, there is always time enough for the Government to transfer to it the preparations which they have made for the needed supply.

I think, therefore, that it is desirable that your Government should take measures for forming new plantations of firewood. A beginning might be made at once, regard being had, in the selection of sites, to soil and climate, as well as to neighbourhood to the probable demand. I am aware that it

is not easy to find suitable land which has not been already taken up for other purposes, and that the employment of such land must of course increase the price of the wood grown upon it; still, that very circumstance may make it profitable to change the cultivation. The chief resident engineer mentions two spots, near Bulsar and near Wussud, which would be convenient to the railway and suitable for planting; should they prove to be so, it will be desirable, so long as the conditions before referred to are not infringed, to commence operations in those localities.

You will also, at the same time, set on foot an enquiry as to the probable requirements of your Presidency for timber and fuel, and the means which you have at present at your disposal for supplying them.

With these remarks, I commend this subject to your serious and early consideration. I shall transmit a copy of this Despatch to the Governor-General of India in Council, to whom you will at once report for sanction what expenditure you will require for the operations which I have suggested in this Despatch."

The correspondence of the officials of the Bombay, Baroda and Central Indian Railway on the subject of railway fuel alluded to in the above Despatch throws an interesting light on the position and opinions held at the time. It opens with a letter dated 5th August, 1867, from the Chief Resident Engineer at Bombay.

He states that much had been already done towards carrying out the views of the directors, in planting the spare land belonging to the Company throughout the district. This had been done by Colonels French and Kennedy. In many districts, however, the plantations did not succeed; there were at the time about 800 acres of babul plantations, estimated to contain about 43,000 tons of wood fuel. The work was proceeding, but as on the southern portion of the line near the coast the plantations had been uniformly unsuccessful, it did not appear advisable to incur further outlay in these districts. The Railway still had about 900 acres of land left suitable for planting. The Locomotive Superintendent estimated the consumption for five trains a day each way on the existing line at 80,000 tons per annum. The Forest Department calculated that 8,000 to 9,000 acres of forest land would be required to supply this amount. The Chief Resident Engineer considered, therefore, that it would be necessary to plant some 7,000 acres more, and that it would be necessary for the Railway Authorities to take up land for the

purpose if they were to undertake the matter of safeguarding the supplies required. He pointed out that on the Madras line the supply of fuel was apparently obtained from old existing forests, and with the extension of his line to Neemuch forests of this type could be tapped. There were also other existing forests which could be tapped when roads had been made to them from the stations on the line. He pointed out that the people consumed large amounts of fuel, yet for the increasing consumption of the growing population no provision appeared to have been made in the way of planting or renewing the forests. The districts near Bombay and along the railway were "even more singularly bare of timber, and here as well as in the large towns of Goozerat, as the supply has to be drawn from a longer distance, the price has been increased, until now firewood sells at Surat at 12 rupees a ton, and in Bombay up to 25 rupees per ton." After alluding to the possibility of supplying coal for the railway, the letter concluded as follows: "As the matter stands, the cost of fuel is likely to be a serious addition to the cost of working railways on this side of India. Colonel Kennedy, this Company's Consulting Engineer, has, I am glad to say, in view the adaptation of mineral oils for engine fuel as a possible solution of this most important question. Much attention appears to have been given to the adaptation, even when coals are at hand at low price, and it is quite certain that if petroleum comes to be used with advantage as fuel for locomotive engines in England, or the eastern States of America, it will be invaluable for use on railways near Bombay."

Colonel Kennedy appears to have been a far-sighted man and to have been nearly half a century ahead of most of his fellow-officials of the time.

The Agent of the Railway addressed a letter, dated 6th August, 1867, to the Consulting Engineer for Railways, Bombay, to be placed before the Government. In this letter he dealt with the fuel-supply question. Reviewing the information already alluded to above, the Agent pointed out that stress had been laid upon the necessity of obtaining an adequate supply of fuel for railway purposes from the resources of India itself. The following extract (1866-7 Report) from the Blue Book Report on Indian Railways for the year 1865-6 and 1866-7, submitted by the Government Directors of Indian Railway Companies in London to the Secretary of State, bears upon this matter :

"The importance of the fuel question can hardly be exaggerated. Cheap and dear fuel, may, in some cases, be almost equivalent to success or failure. It will be seen by the following statement that the high rate of freights from the country at the present time makes the value of coal and coke, before it is landed in India, something like 50s. per ton. When to this is added the landing charges, and the cost of conveyance down the lines, the average cost of coal for the

railways on the western and southern sides of India may be taken at about 60s. per ton. Thus, while the cost of coal per train mile on the East Indian Railway was 3½d., on the Great Indian Peninsula it was 1s. 6½d. last year.

COAL EXPORTED FROM ENGLAND

Railways.	Coal and Coke sent out during 1865.	Cost in England.	Freight.	Average cost per ton on arrival in India.	Estimated average cost over the line.
	Tons.	£	£	£ s. d.	£ s. d.
Great Indian Peninsula	Coal. 37,569	20,952	58,623	2 2 4	3 0 0
" " "	Coke. 13,575	15,324	19,454	2 11 3	3 12 0
" " "	Patent fuel. 8,404	5,427	14,370	2 7 1	3 8 0
	Coal.				
Madras	7,140	3,861	13,919	2 9 9½	3 0 0
Bombay and Baroda . .	37,219	19,462	60,585	2 3 0	3 18 0
Sind	7,952	4,735	16,704	2 12 8	3 0 0
Great Southern . . .	3,663	1,996	7,541	2 12 0½	2 18 0

Mr. Oldham, the Superintendent of the Geological Survey of India, had recently published a Report on the coal resources of the country. This Report did not, the Agent thought, encourage the hope that coal would be found in many parts of India in positions where it could be of very great value to the railways. Viewed as a coal-producing country Oldham wrote :

"The British territories in India cannot be considered as either largely or widely supplied with the essential source of motive power. Extensive coal fields do occur, but these are not distributed generally over the districts of the Indian Empire, but are almost entirely concentrated in one (a double) band of coal-yielding deposits, which, with large interruptions, extends more than half across India from near Calcutta towards Bombay."

He adds, further on in his Report :

"There still remains, however, much to be surveyed, and, until careful mapping has been carried out of all the fields, any estimate of the coal resources and productions of British India must be defective. Up to the present time it may be said that little more than surface workings have been carried on in India. In parts of the Raneeunge field these open workings are of marvellous extent and size, covering hundreds of acres."

The Agent consequently concluded that coal would be available for the lines passing through Bengal and Central India. He continued :

“ The Bengal Railways have, indeed, already obtained their fuel from the collieries near Raneegunge. The Central India coal has not been used by the Great Indian Peninsula Railway, as the line is not yet sufficiently near the collieries, and the cost of conveying it by the road would make it too expensive. In the upper, western and lower parts of India it may be presumed that the railways will not possess the advantage of native coal. The importance, therefore, of obtaining other sources of supply increases every year. Coal from Australia and Labuan is being tried, but wood is what we must look to chiefly if economy is to be secured. The subject has engaged the serious attention of Government, both at home and in India ; several Despatches, pointing out the importance of the subject, and suggesting the necessity of adopting immediate measures for increasing the plantation of suitable timber, have been addressed to the Government of India by the Secretary of State during the year. It has been calculated that a plantation of 20 acres will be the average proportion required to meet the requirements of every mile of railway, and Lord Cranborne observed, that it was ‘ evidently necessary that planting on an extensive scale should take place annually for several years to come.’

On the East Indian Railway (1,120 miles open) coal is generally used, and is obtained from the Bengal collieries at a price which may be taken as an average of one-sixth of what we have to pay per ton for imported coal delivered on to our line in Bombay. The whole expenditure of the East Indian Railway for coal, coke and wood during the six months ending 30th June, 1866, amounted, according to their half-yearly Report, to Rs.3,37,487. On our line (306 miles open) the consumption of coal, coke and wood during that half-year was 11,286 tons, of which 400 tons only were wood, and the cost of the whole was Rs.3,33,764.

On the Madras Railway (645 miles open) large quantities of wood fuel, drawn from the Government forests adjacent to the line, are used. I am informed by the Agent that for the year 1866 the consumption of wood fuel was 48,000 tons, and the cost of it, delivered on the line, averaged five rupees a ton ; this would be equal, taking the power of coal to wood as one to three, to 16,000 tons of coal at Rs.15 per ton, or about half the price which we have to pay for imported coal delivered on to our line in Bombay. The Madras Railway also imported a little coal from England, for which they would pay as much, or more, perhaps, than we do. The total expenditure of the Madras Railway Company for fuel during the six months ending 31st December, 1866, was, according to their half-yearly Report, Rs.1,61,260. On our line (306 miles open) the

consumption of coal, coke and wood during that half-year was 8,53 tons, out of which 320 tons only were wood, and the cost of the whole was Rs.2,93,969.

If coal for the use of railways was procurable on this side of India on the same terms as the East Indian Company get it in Bengal, the Baroda Company would have saved during the year 1866 about £45,000, and if the Baroda Company had access to such a supply of cheap wood fuel as the Madras Company have, the saving during the year would have been about £25,000. On the Great Indian Peninsula Railway, whose consumption of fuel is of course much greater than on the Baroda line, the saving would have been represented by a proportionately larger sum of money."

The Agent proposed that the following steps should be taken :

"(1) That immediate steps should be taken for carrying out in the vicinity of the Baroda line the desire of the Secretary of State for the formation on a large scale of yearly plantations, which may in time supply the line with a considerable quantity of wood fuel in the locality which would be most convenient for these plantations and in which they would grow, together with the terms on which they should be formed, are matters for the decision of Government

(2) That the geological survey of the districts through which the projected extension from Guzerat to Delhi will pass be actively prosecuted, with the view of ascertaining whether coal exists. I believe that very little is known as to the geological formation of Rajputana, and the country beyond the Gackwar's territory by the Myhe Valley to Neemuch has been hardly ever visited by Europeans. If a coalfield of a satisfactory nature can be found, it will be worth while to connect it with the railway."

He concluded this valuable exposition of the position with the words: "Under present circumstances, if the supply of coal imported into Bombay failed for a short time, or the Indian trade was interrupted by a war, the two Bombay railways would be seriously embarrassed, and might have to diminish, if not to suspend, working altogether, owing to want of fuel."

In a brief communication addressed to the Under-Secretary of State, the Secretary of the Company at the Indian Offices forwarded the correspondence and draws attention to the Agent's figures in comparison with the charges for fuel on the East Indian Railway compared with their own. He points out that the matter is of great importance when considering the working costs of the line; and that "the importance increases vastly when the anticipated extension across the country to Delhi and Agra is taken into account."

This question of the provision of the fuel required by the Railway was referred to Dalzell, the Conservator. The latter did not agree with the calculations and estimates of the Railway Authorities. H

pointed out that the Agent's estimate of the annual yield of an acre of forest land (15 tons of firewood) was incorrect. Dalzell contended that "according to the best authorities in Germany, where this subject has been studied in a scientific and practical manner, an English acre of woodland will yield no more than two tons of dry wood per annum." Dalzell was nearer the mark than the Railway Authorities, both as regards quantity and age. He said instead of 8,000 acres, 56,000 acres (87 square miles) would be required to supply the fuel for the railways; and that not poor stony land but good soil, and that close to the line, would be necessary. The Railway calculation implied a rotation of seven years, but he considered that to get good fuel fifteen years would be necessary.

These estimates may be best shown as follows :

RAILWAY ESTIMATE

8,000 acres for 100,000 tons per annum = $12\frac{1}{2}$ tons per acre per annum.

1 ton = 2240 lbs. = say, 40 cubic feet.

$\therefore 40 \times 12\frac{1}{2} = 500$ cubic feet per acre per annum increment

To obtain this 100,000 tons per annum on a 7-year rotation from 8,000 acres, it would be necessary to clear fell annually 1,143 acres, and obtain from this area 90 tons of wood per acre, or 3,600 cubic feet—an impossible proportion for the class of scrub forest envisaged.

GERMAN ESTIMATE

2 tons of dry wood per acre = $2\frac{1}{2}$ tons green wood (really more).

$2\frac{1}{2}$ tons $\times 40 = 100$ cubic feet per acre.

To obtain this yield 40,000 acres of plantations would be required.

Alluding to the suggestion that the waste lands should be planted, Dalzell observed that as the population would not use these waste lands as they were unfit for cultivation, they would also be unfit for plantations. He advanced the theory (to which modern-day Forest Officers will demur) that "if crops cannot be grown on such lands, it is hopeless to expect plantations to flourish." The Conservator considered, therefore, that as long as coals could be obtained at from Rs.24.8 to Rs.27 per ton it would not be advisable to make firewood plantations for railway purposes. He also made some remarks about the amount of water in the fuel, which would upset the Railway calculations as to the cost of wood fuel as compared with coal. Both the Agent, Bombay-Baroda, and the Agent of the G.I.P. Railway replied to the Conservator's letter. The latter summarised the opinions expressed by the Railway Authorities on the letter. He disagreed with the Conservator's statement that coal would be preferable to wood from plantations, and concluded by saying :

"As the Deputy Commissioner, Akola, has offered me 3,500 acres,

I shall commence on this as an experiment, and as there is much land in Berar and Central India waste, but still fit to grow babul (*Acacia arabica*), I hope to extend the plantations."

The Government of Bombay sided with the Railway and Civil Authorities in their view of the matter. In their Resolution dated 30th January, 1868, they remarked that: "There seemed no reason to doubt the propriety of making extensive experiments in the way of attempting to increase the supply of fuel for the railways. The Conservator should be informed that Government attached great importance to this trial, and rely on him to exert himself to ensure its success." They did not think it would be possible to obtain all the land it was estimated would be required, but "if a start be made a steady demand will be created and private enterprise will, no doubt, supplement the efforts of Government, and eventually ensure a steady supply!" That elusive will-o'-the-wisp private enterprise which Government after Government had persisted in placing faith in for the past seventy years!

The Survey Commissioner, Colonel Francis, had distinctly stated that there were large tracts of land available for forming fuel plantations in the Northern Konkan, on the line of the Baroda Railway. The Conservator should arrange that tracts chosen should be planted up at the proper season. The Government considered that "trees of the *Terminalia* genus (*ain* and *kinjal*) would succeed if planted in this district, and these should form the bulk of the plantations, a small portion being set aside for the Australian gum trees and other exotics selected by the Conservator.

In Kandeish the Collector should select up to 3,000 acres for plantations of babul or other suitable species. This land should be taken up before the monsoon and planted during the season by the Assistant Conservator of Forests. If the Baroda line was extended to Neemuch, 5,000 acres should be set aside in the Panch Mahals for the same purpose. Letters should be addressed to the Commissioner, Central Provinces, and the Resident of Hyderabad, asking them to form similar plantations to such an extent as might be possible in their respective charges near the line of rail." Lastly, the Government of India were asked to provide in the Forest Budget for the following year, 1868-9, a sum of Rs.25,000 for this purpose as follows: Tanna Rs.10,000, Guzerat Rs.5,000, Khandeish Rs.10,000. The Resolution concluded: "The railway agents should, however,

be warned that they cannot reasonably expect to obtain fuel at the price it is procurable on the Madras line. But as there is a wide margin between that price and the price which it will be remunerative for the Companies to pay, the experiment can hardly fail to be successful. It may also be worth their while to try and induce contractors to engage for supplying fuel from private sources by offering to take, some years hence, a certain supply at not less than, say, Rs.10 or Rs.12."

The Secretary of State (Despatch R.F., No. 8, dated 8th April, 1868) agreed with the views of the Government of Bombay, saying that "the Conservator takes, as it seems to me, an unnecessarily desponding view of the advantage of these experiments." After dealing with the species it was suggested should be tried the Despatch continues :

"Colonel Francis writes as if jungles and forests were to be made over to the railways. But the observations in your resolution, warning the railways that they must not expect that Government can provide all the fuel which the companies may require for the service of their line, or that they can obtain it on any other terms than the fair market price of the article, will show them that, though the Government are anxious to increase the general supply of fuel, in consequence of the increased demand, and to provide, as far as possible, for the wants of the whole community, the companies cannot expect special advantages, either of supply or in price, beyond those which are given to the rest of the population.

The officers to whom the formation of these plantations may be entrusted should be told that Her Majesty's Government take particular interest in these experiments, and that regular accounts should be kept of the number of trees put in, the mode of treatment, and the rate of growth. I entertain little doubt that much benefit will accrue to the State and to individuals, as well as to the railway companies, from these efforts, and I rely upon Your Excellency in Council to see that they are prosecuted with vigour and (so far as is consistent with efficiency) with economy."

In the correspondence of 1868 some interesting light is thrown upon the matter of acquiring land for the fuel plantations, and from this it would appear as if the Conservator had been unduly influenced in his opinions by the general opposition of the Collectors to giving up land for forest purposes on which the Secretary of State had already had occasion to

animadvert strongly in previous years. The Acting Collector of Khandeish and the Deputy Conservator of Forests had apparently reported that there was little land available for plantations in the district, and stated that for the reasons given the proposed plantations for railway purposes in Khandeish had better be confined to a few detached patches.

It has to be borne in mind that in those days officers in charge of Districts lived remote from head-quarters and that communications and postal facilities were in a very undeveloped state. But even when every allowance is made it appears difficult to understand the attitude of mind of officials who could thus more or less openly flout the expressed orders and wishes of their own Government and of the Secretary of State.

The Government of Bombay's Resolution on this matter might be termed lenient. It is as follows :

" It is not to be expected that land will be procurable in any quantity near a railway station. It will be quite sufficient that the plantation should be near a railway, as a siding can always be constructed for the carriage of the fuel.

The Collector refers unnecessarily to Mr. Dalzell's opinion, which has nothing to do with the orders that have been issued for the experimental formation of fuel plantations.

The Revenue Commissioner should be requested to call Mr. Shepherd's attention to the instructions recently received from the Secretary of State on this subject, and inform him that this Government is not prepared to abandon these experiments on the opinion of one of its officers that they will not be successful in a financial point of view.

It would be well if the land pointed out by Mr. Pedder were examined by the Collector, or one of his assistants, as well as by the Assistant Conservator of Forests. It seems to have been summarily rejected on the Report of a forest inspector. Any site of 50 acres or more that is procurable should be planted this season without delay."

In the Tanna Collectorate better progress had been made by Colonel Francis, Survey and Settlement Commissioner, assisted by Mr. Shuttleworth, Acting Conservator of Forests (Deputy Conservator ?). Five tracts of land, 1,800 acres in all, had been taken up and demarcated. This was less than the area of 5,000 acres laid down, but it had been found on examination that several of the unoccupied tracts included in Francis' original estimate of available lands were unsuited for fuel plantations.

The deficiency might have been made up by the purchase of occupied lands but this purchase would have absorbed a considerable part of the grant assigned for the work, and so the question of taking up such lands had been left pending. These tracts were on the railway line, which added to their value, as the existing railway fencing would save the cost of fencing on one side of the plantation. Owing to the lateness of the year by the time these areas had been demarcated no planting work had been undertaken. In spite of Dalzell's adverse comment on this land that "the assessment being low, it is inferred that the soil is very inferior," the Government of Bombay and the Secretary of State cordially thanked Francis for his work and impressed upon the Collector and Conservator the necessity of adding to the plantations for the general use of the Presidency as opportunities occurred.

In May, 1869, the Secretary of State in a Despatch to the Government of Bombay wrote :

"The proposals of Mr. Bellasis, Officiating Revenue Commissioner, N.D., for making use of the waste lands belonging to the Bombay, Baroda and Central India Railway, but outside their fences, by converting them into fuel reserves, under the charge of the Forest Department, were very properly approved by Your Excellency in Council. They are likely to form plantations from which the railway may be supplied with fuel at economical rates, while they yield a good profit to the Department."

This appears to be the last record in the correspondence on the subject of the railway fuel supplies for the period under review.

The Resolution of the Government of Bombay on the Annual Reports for the Bombay Forests of 1868-9 and a Memorandum of the same date (February, 1869) throw a strong light on the position of conservancy in the Presidency and indicate the reasons why so little progress was being made. In fact, it was recognised that conservancy matters were going backward instead of forward. One of the causes was undoubtedly due to the orders issued several years before that the functions of the Conservator of Forests were to be advisory only. It is apparent that the powers of the Conservator were originally restricted owing to the outcry of the civil officers against any interference with their authority over the areas within their jurisdiction. It was an unfortunate decision, bound to result

in failure, and its effects were to persist to a much later date. Some of these matters are alluded to in the Government review of the Annual Reports for 1868-9; but the full summary of the existing position is given in a Memorandum by Brandis.

The Report in question was written by the Conservator of Forests, Dalzell, and it is concluded in terms which cannot but cause surprise and disappointment to the present-day Forest Officer when he reflects on the extraordinary possibilities which lay in the hands of those first appointed Conservators in the young Forest Service of India. The Chief Secretary to Government, concluding his Resolution on the Report, wrote: "Mr. Dalzell, throughout his Report, writes as though it were his sole duty to furnish Government with a review of the operations of the Forest Department, and not to exercise a direct personal supervision." And this, in effect, was the attitude taken up by the Conservator. He was evidently smarting under the restrictions which prevented him from corresponding with his own officers direct; and full sympathy may be accorded to him in a difficult, if not impossible, position. But he had taken no action with the object of obtaining a modification of this old order. Moreover, this order was the direct outcome of the sanction given to the Rules for the better conservation of the forests drawn up by Dalzell, Anderson and Goldfinch in 1861. It was decided under these Rules that the forest establishments of each Collectorate were to be under the Collector, the duties of the Conservator to be advisory only! (Vol. I, p. 327). The present correspondence and the Conservator's own Report give evidence that a most regrettable state of friction existed between the Conservator and many of the Collectors of districts. It accounted for the desire of the Bombay Government that Brandis should visit and make suggestions on the management of the Forests of the Presidency. It will be readily understood that the untoward friction thus engendered in the districts and the antagonism, already present amongst the people throughout the country as a whole, against the introduction of conservancy into the forests, inevitably put back Forest Conservancy in Bombay by many years.

The net revenue of the forests for 1867-8 was Rs.2,63,558 against the preceding year's Rs.68,244, and the percentage of expenditure compared with receipts was at the same time reduced from 88 to 61. The only districts represented as still continuing in an unsatisfactory state as regards finance were Tanna and Surat. The Conservator's Report abounds in

complaints of deviations from existing orders and irregularities, without, however, making any suggestions for their regulation in the future, or showing evidence that he had taken any steps towards making a personal enquiry in the matters dealt with. The position of the Department at this time was regrettable and it did not improve.

As regards finance the Report of the following year showed the greatest receipts recorded since the inauguration of the Forest Department in Bombay. The total receipts during 1868-9, including the realisations on account of previous years' outstandings, amounted to Rs.9,64,527 and the total disbursements to Rs.4,61,759, leaving a net revenue of Rs.5,02,768. Compared with the previous year there was an increase of Rs.2,82,527 in receipt and Rs. 43,318 in expenditure, and a decrease of 13 in the percentage of the entire expenditure contrasted with the receipts. The value of the stock on hand on 1st April, 1869, was estimated at Rs.2,87,930 against Rs.6,29,595 on 1st April, 1868. Government expressed their satisfaction at the financial position. On the subject of the attitude of their Conservator, vis-à-vis the plantation work, they remained far from content. In the Government Resolution (22nd September, 1869) they wrote :

" Mr. Dalzell appears to consider the expenditure that has been incurred (amounting to Rs.1,18,956.10.4.) during the year on account of plantations, forest roads and rewards for planting trees, etc., as 'unproductive' and 'unremunerative.'

This, of course, is true if the remarks refer to present and immediate returns ; but Government are satisfied that the greatest benefit will hereafter result from these plantations if the sites are properly selected. On no account should the attempts that have been made in this direction be discontinued, however discouraging the results may appear in the first instance. Fuel plantations are of vital importance in the vicinity of railways and large towns. For example, there is no limit to the supply of good 'babul' that might be produced in the Government 'kooruns' on the banks of the Bheema in the Poona Collectorate ; and the railway which runs nearly parallel would afford every facility for transport.

Present outlay must not be grudged, as, if judiciously made, there is no doubt as to the future large pecuniary returns, to say nothing of the great benefits that will be conferred on the country at large.

His Excellency in Council considers that sufficient attention has not yet been paid to this important work of setting aside sites for plantations and for forest reserves, although the subject has, during the last few years, been repeatedly urged on all concerned.

During the approaching season Government will be prepared, on the recommendation of the Revenue Commissioner and Conservator, to sanction the employment in each Collectorate of an experienced Assistant Collector solely on this duty. He should be accompanied by the Deputy Conservator and the surveyor. Whatever expenditure may be required for taking up land for fencing, or for planting, etc., should be carefully estimated for and inserted in the Budget."

That the Government of Bombay had learnt the lesson, taught by the bitter experience of some sixty years, of the disastrous effects of permitting wood contractors to cut on license is evidenced by the following paragraph in the Resolution :

" His Excellency the Governor in Council must again record his decided dissent against the system of cutting by license. There is no reason why the work of cutting should not be done by contract : but it is a ruinously destructive plan to turn a wood contractor loose into a forest and allow him to cut *ad libitum*."

These Reports display, without any reservations, the unfortunate condition into which the Department had drifted ; for the apparent prosperity, displayed by the financial statement of the 1868-9 Report, was in point of fact delusive. Brandis' Memorandum, already alluded to, throws a clear light on to some of the reasons which led up to the existing position. This Memorandum was drawn up at the request of the Government of Bombay in order that Brandis might be furnished with certain information he desired upon the present management of the Department and the forests. This information would enable him to decide upon the areas he considered it would be most advisable to inspect during his projected visit to the Presidency during the winter of 1869-70. The position as detailed in the Memorandum was sufficiently amazing and accounts for the want of real progress of the Department ; but it cannot be considered to absolve the Conservator from his obvious responsibilities or to excuse the supineness which

prevented his taking such action as would have ameliorated the position. The Memoranda prepared by Brandis during the period of the introduction of conservancy into India were apt to be somewhat discursive. He effectively pleaded in extenuation the state of ignorance which prevailed amongst the official classes and the native community at the time on the subject of the real aims of scientific Forest Conservancy; prolixity was therefore unavoidable if he was to make himself understood. The Memorandum in question is of such interest and importance that it becomes necessary to reproduce parts in some detail. The Inspector-General commenced by summing up the existing procedure in the Presidency.

“ The entire executive responsibility in connection with forest management in each district is vested in the Collector and the Officers under him, including the Assistant Conservator. The duties of the Conservator are confined to a general inspection, and he is required to give advice on all forest matters regarding which he may be consulted by the Government, the Revenue Commissioners and the Collectors.

The Conservator does not exercise any control or supervision over the executive management of the forests.

This organisation was introduced in 1861-2, and subsequently, in June and July, 1865, orders were issued in the same sense.

The subordinate forest establishments are attached to ‘ talookas ’; one inspector and a number of Foresters are generally in charge of the forests of one ‘ talooka,’ and these subordinate officers are under the orders of the ‘ mamlutdar.’

The chief Forest Officer in each Collectorate is styled Deputy or Assistant Conservator. He reports to the Collector, and, as a rule, receives orders from the Collector only.

In Canara and Tanna there are two assistants in each Collectorate; in the Northern Division and the Deccan, where the forests are few and of little importance, one Assistant is in charge of several Collectorates.

In all cases the Assistants are subordinate to the Collectors, and do not receive their orders from the Conservator of Forests.

The Assistants issue their directions to Inspectors and Foresters through the ‘ mamlutdars ’ of the ‘ talooka.’ In some Collectorates the Assistants have charge of all forest matters; in others the Collector retains the management of certain forest tracts in his own hands. It also happens occasionally that Collectors issue orders regarding felling and other operations in the forests without the concurrence of the Assistant.

Forest questions of importance are referred by the Collectors to the Revenue Commissioners, who consult the Conservator on all

matters that require reference to Government ; in certain cases the Collectors refer forest questions to the Conservator direct.

The Forest Budgets are prepared by the Collectors, and revised by the Revenue Commissioner and Conservator before submission to Government.

The monthly forest accounts of the Collectors are prepared by the Deputy Collectors in charge of treasuries, and submitted to the Accountant-General through the Conservator, who has a share in the auditing of the forest expenditure. If this sketch of the present organisation is correct, then I do not see how the Conservator can be held responsible for an efficient administration of the forests. It is, of course, clearly his duty to do his utmost, by way of giving advice and making representations, to secure a good and rational management, though he may not have the power of exercising any supervision or control. But it cannot be denied that the Conservator's position is not a satisfactory one, and that it is a very difficult task to govern an important branch of the public business without any other authority except the permission to give advice and to make representations.

In the orders on the Forest Reports for 1867-8 it is said that the Conservator does not apparently consider it his duty to exercise a direct personal supervision over the operations of the Forest Department.

In the orders of July, 1865, the right of exercising control and supervision was expressly denied him. It would therefore appear that some modification of the previous orders is now contemplated.

If I correctly apprehend the views of the Bombay Government in this matter, I would suggest, as the first step in this direction, that every encouragement be given to the maintenance of a regular correspondence between the Conservator and the Deputy or Assistant Conservators. I understand that the Conservator has the right of corresponding with the executive Forest Officers through the Collectors, and he should be directed to avail himself fully of this right of correspondence, in order to ensure the carrying out of his proposals regarding the administration of the forests.

The Collectors should be kept informed of what is going on between the Conservator and the district Forest Officers. This may be effected by letting the correspondence between Conservator and Assistants pass through the Collector's Office, without, however, causing any detention.

The Collector would, whenever necessary, enter his remarks on the face of the communications thus transmitted through his office. When the communication is directed to the Assistant, the Collector would furnish the Conservator with a copy of his remarks. Deputy and Assistant Conservators should be required, as part of their duty, to keep the Conservator regularly informed of whatever is going on in the forests of their districts, and they should be bound to carry

out the Conservator's orders and instructions, special cases excepted, when the Collectors should have the power of modifying or suspending the Conservator's orders. In all such cases a special Report should at once be made to the Revenue Commissioner, and the reasons for declining to sanction the Conservator's orders should be communicated to that officer (the Conservator). At the same time the Conservator should be directed to seek every opportunity of personally discussing with the Collectors the measures which he may desire to see carried out. Where the Collectors take a special interest in the management of their forests, this personal intercourse will serve to obviate all difficulties and complications that might possibly arise from adopting the plan here suggested.

I do not mean to imply that this arrangement will secure an efficient administration. But it may be useful as a transitory measure, to be replaced hereafter by a more satisfactory organisation.

Whether it may eventually be decided upon to centralise the whole Department under one Conservator, or to have three Conservators, each under one of the three Revenue Commissioners, it will probably be found to be advantageous for the public service to entrust the administration of State forest domains to officers specially trained for their work, and to give to the junior and less experienced men the advantage of the control and guidance by older and more experienced officers of the same Department. It appears to me probable that the administration of the communal and village forest also may hereafter with advantage be entrusted to the officers of the special Department, acting in concurrence with the Collectors in all matters relating to the rights and interests of the people. With reference to the last remark, I beg to submit, for the perusal of His Excellency, a Report containing suggestions regarding the administration of village forests in Mysore submitted by me some time ago to the Commissioner for the Government of the Mysore territories.

As long as public forests were not clearly defined and separated from private lands, it possibly was the right course to take to entrust the Collectors with the charge of all forest matters; but as the work of demarcation progresses, it may be considered whether a change in the mode of administration will not be beneficial to the public interests.

These, however, are matters for consideration hereafter, and do not at the present time call for discussion.

My second suggestion is, that in all districts and 'talookas' where the Revenue Survey and Settlement is in progress, or where the demarcation of Government forests is going on, the Forest Officers be directed to co-operate with the officers of the Revenue Survey Department in all matters relating to the defining and demarcation of public forest lands. If my first suggestion is

accepted, Forest Officers would keep the Conservator informed of the progress of these operations. No settlement of the boundaries of any public forests should be made without the concurrence of the Deputy or Assistant Conservators acting in this matter under the orders, and in accordance with the instructions, of the Conservator of Forests.

I would, thirdly, suggest that Forest Officers be directed to make themselves acquainted with all unoccupied lands in their district that might advantageously be included within the limits of the Government forests. In the Konkan there are probably considerable areas of *wurkus* land covered with jungle, or fit to grow jungle, and which has not yet been occupied. Small isolated plots should be avoided. Forest Officers should apply for the occupancy of suitable lands, and the Department might pay the assessment until the question of including them within the Government forests has been decided.

Fourth. In the matter of forest legislation, I would draw attention to the peculiar difficulties under which a portion at least of the Bombay Forests are placed in the matter of protection. I understand that the Government forests are frequently so interlaced with private forest lands that protection is impossible without a system of strict control over all timber, wood and forest produce in transit, whether it is the produce of Government or private lands, or has been imported from forests beyond British territory.

The existing Forest Act (VII of 1865) does not provide for the exercise of such a control. The object in view would, therefore, not be furthered by extension of this Act to Bombay. But a revision of the Act is at present under the consideration of the Government of India, and I would suggest that a Report be made, as soon as practicable, to the Government of India of the circumstances which appear to render necessary the introduction of a special clause. I would also suggest that the question be asked whether it is intended in the revised Act to provide for the control of timber, wood and other forest products from all forest lands, whether Government, private, or situated beyond British territory, while in transit by land or water.

Should such a clause not be included in the revised Act, then special legislation for the Bombay Presidency would become necessary.

My fifth suggestion is, that a statement or Report be prepared by the district Forest Officers, under the supervision and with the assistance of the Collectors, relating to all public, that is, Government and village forests (lands set apart as the village grazing grounds) in each district or 'talook.'

This Report should exhibit the area of these wood-lands, and should give an account of their general character.

The following remarks will explain the object and nature of this Report :

In the Colaba Division, under Mr. Shuttleworth, I understand that the Government forests consist of a large number (about 800) of little patches, the largest of which measures about 5,000 acres, the smaller ones having an extent of a few hundred acres only. And the Government wood-lands in other districts are similarly situated.

No useful purpose would be gained by giving an enumeration of all these small plots of land.

It may, therefore, be useful to give a general account of the Government and village forests in each 'talooka,' or other sub-division of the country. But the larger and more important forests should be enumerated; their area and general character should be stated. Forests of large extent which are situated on the confines of two or several 'talookas' might be treated separately.

It should be carefully explained whether these wood-lands are the undisputed property of the State, and whether the surrounding inhabitants exercise the right of grazing cattle, of cutting wood and timber, of collecting other forest produce, or of *Kumri* cultivation on these lands. Remarks should be added regarding the origin of these rights; also whether they have been formally conceded to the people or not.

It should further be explained whether any claims are raised, or are likely to be raised, by private parties to the occupancy or ownership of these lands.

It would be very useful if to the above information a statement could be added of the quantity of wood, timber and other forest produce yielded by the Government wood-lands in each 'talook' or other sub-division. The longer the series of years for which these data could be collected the more useful would be the statement, the object being to obtain an approximate estimate of the capabilities of the forests.

The yield of the forests in different years should be fully discussed and explained. In most Collectorates, it is believed, the area of what have been considered as Government wood-lands has within the last ten years been considerably reduced. Wherever practicable, the former extent should be compared with the present area of the forests, and the decrease should be explained in detail.

It should also be stated whether any of the forests have been worked in accordance with a regular plan of operations; also, whether they are in an exhausted or in a flourishing and thriving state.

Formerly Government exercised the right of ownership to teak and other royal trees on private lands, and a portion of the yield of the forests was derived from this source. It should be explained whether these royal trees have now been given over to the occupants

of the land, or whether they are still considered the property of Government; other forest rights of Government on lands in the occupancy of private parties should be stated.

These descriptive accounts of the forests in each Collectorate would not be complete without a statement of the establishment entertained for the management and protection of the forests.

Their distribution and duties should be explained. It should also be stated whether the protection of the forests is satisfactory or not, and, wherever necessary, suggestions might be added with the view of introducing a better protection of the forests.

These Reports will demand some time and trouble, which, however, I think, will be usefully spent. The collecting and arranging of the materials will induce the local Forest Officers to take a detailed review of the forests in their charge, of their extent, their condition, and their capabilities. These Reports will enable me to select beforehand the forests in every Collectorate which it would be most instructive for me to visit, and they will afford me a portion of the data upon which my proposals for the administration of the forests must eventually be based.

They will thus greatly facilitate the work which it is intended to entrust to me.

My last suggestion is, that as soon as orders have been passed regarding my tour of inspection through the forests of the Bombay Presidency, authority be given me as a temporary measure, before and during my tour of inspection, to correspond officially on all forest matters with the Conservator of Forests and the Revenue Commissioners.

The Conservator of Forests might be requested to keep me informed of all important occurrences relating to the administration of the forests, and to furnish me with such information as I may require.

I do not think that I should have any occasion in writing to the Conservator to offer suggestions, or express my own views on any questions except those of a purely professional character. Under all circumstances it should be clearly understood that the permission to correspond officially with the authorities named need not in any way imply that my suggestions should be adopted, or that the expression of my views should in any way influence the action of these officers.

On professional matters I would endeavour to secure the Conservator's assent to my views, but would, as a matter of course, claim no official authority whatsoever."

In their Resolution on this Memorandum the Government of Bombay granted permission to Brandis to correspond direct with the Revenue Commissioners and Conservator on all topics of a professional character involving expressions of

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satisfactory manner for his visit to the Presidency. His tour through some of the forests of the Presidency had valuable results. For one thing the Forest Officers learnt for themselves the type of man they had as an Inspector-General, and had personal experience of his amazing energy and his apparent inability to feel fatigue. They were also introduced to his favourite method of making linear valuation surveys during his progress through the forests. Captain Peyton, in charge of the valuable Canara Forests, thus refers to these matters in his Annual Report for these forests for 1869-70: "On the 17th March last (1870) Dr. Brandis, the Inspector-General of Forests, arrived by steamer at Carwar, where I met him. . . . I will but say here how indebted I feel to him for his many and valuable suggestions. His system of valuation surveys of the forests is an excellent one, and will be fully attended to hereafter. During his tour, which extended in Canara over 15 days, we spent daily in the forests, examining and making surveys of them, from six to eight hours. The days were very hot, and the exposure and walking rather severe. Indeed, I may say, were it not for the example shown us all by Dr. Brandis, whose energy and endurance was something truly remarkable, I doubt if so much work would have been got over within the time." How many Indian Forest Officers now retired, and how many of those still in the Service, who were forest probationers on the German practical courses will read these lines with a secret sympathy for what Peyton must have endured—and suffered! For have they not gone through much the same experiences, much the same treatment at the hands of that man of iron! But that amazing energy of his resulted in the foundations of the Forestry Department being well and truly laid.

Brandis duly carried out his tour of the Presidency. A brief and interesting summary of the visit is given in the Conservator's Annual Report for 1869-70. This Report was written by Mr. A. T. Shuttleworth. Shuttleworth had become a senior Deputy Conservator of Forests in the Presidency and took over charge of the Conservatorship from Dalzell in September, 1869, on the latter's retirement. Shuttleworth had shown himself a capable and tactful Forest Officer. It would not be of material interest to follow Brandis on this tour since the forests are now well known.

The Government Resolution on the Conservator's Report for 1869-70, which is a most interesting and informative

document, deals chiefly with the financial aspect. There can be little doubt that the Forest Officer and the Collector were expected to reduce the forest expenditure to the smallest amount at all justifiable, and this had bad after-results, especially on the low-paid and inadequate subordinate staff about whose incapacity and bribe-taking there had already been considerable complaints and controversy. But what could any Government or Civil Officer expect if the subordinate Forest Staff was not only paid less than the menials of the same rank and walk in life in the civil Collectorate, but received less than a living wage?

In a Despatch (R.F., No. 69, dated 3rd March, 1870) the Secretary of State thus alluded to these matters :

“The resolutions of Your Excellency in Council as a general rule deal sufficiently with the various points of detail arising out of the Reports. I desire to express my concurrence in your repeated expression of opinion as to the inexpediency of having recourse to the permit system in preference to that of cutting under the direction of the Department whenever it is possible. It may be that by the former system the actual cutting and removal of the material can be performed by contractors at a rate which will exhibit a favourable balance for the year ; but this, as has been often proved, is only obtained by the sacrifice of the future productiveness of the forests.

The revival of the practice of *Kumri* in Canara is unfortunate, but I trust that it will be put a stop to by the instructions which you have issued.

I am glad to perceive, by Nos. 138, 210 and 211 of the Abstracts of your Proceedings for August and December last, that progress has been made towards legislation for the protection of Government forests, a measure which seems especially necessary in your Presidency, from the peculiar position of the forests relatively to those of foreign states and private individuals.

I have perused with much interest the Memorandum by Mr. Brandis, before his visit to your Presidency last year, but as I learn from your Proceedings of September that he is probably by this time at your Presidency assisting you to frame a new system of management for the forests under your care, I shall not comment in detail on the several proposals made by him. I will not, however, forbear to express my strong opinion on the point noticed by you in No. 161 of your Abstract

for October. It seems to me impossible to read the Reports and the documents relating to the management of the forests of your Presidency for many years past and not to be struck with the evil arising from the arrangement by which the head of the Department has been cut off from all real power and authority over his Department. I trust that the new arrangements will provide for the separation of the forests from the Revenue Department, and will place all the officers under a responsible head of the Forest Department. It is only by a well-considered system of this kind that efficiency can be secured, and I will not doubt that officers of both Departments, as well as those of the Survey Department (the operations of which have often an important bearing on forest land), will act harmoniously together for the important object which Her Majesty's Government have in view in the preservation of the Forests of India for the benefit of the community. You will inform me of the measures which you may adopt for this purpose.

In the meanwhile I readily, and with full confidence, accept the assurance with which you close your Despatch under reply, that this important branch of revenue administration receives and will continue to receive your best attention."

The Revenue had again increased in 1869-70, amounting to Rs.10,23,433, which was an increase of Rs.58,905 over the previous year, which had been the best on record. The total disbursements were Rs.4,15,477, falling short of the entire expenditure of the previous year by Rs.48,281, being a net revenue of Rs.6,09,955. The following remarks are from the Government Resolution :

"The financial results, as contrasted with those of the preceding year, showing upon the whole a steady improvement in the receipts, with a general decrease in the expenditure, are highly satisfactory. The only districts where the receipts seem to fall short of the expenditure are Rutnagherry and Tanna ; and, in the case of both of them, the Conservator has explained that the apparent deficit was chiefly owing to extra charges not legitimately appertaining to them having been debited against them.

The exertions made in establishing and extending teak and fuel plantations in the several districts appear, on the whole, to be attended with sufficiently encouraging results, and

the progress hitherto made shows that due attention is paid to Forest Conservancy by the officers employed in the work.

With reference to the remarks in paragraph 68 of Mr. Shuttleworth's Report, Government direct that the prohibition against the system of cutting by license, implied in paragraph 11 of their Resolution, No. 4019, dated 22nd September 1869, on last year's Forest Report, should be strictly enforced throughout the Presidency."

This latter remark was caused by a paragraph in the Conservator's Report on the subject of a five years' contract to cut in the Padshapoor jungles which had been given out by Mr. Goldfinch, late Collector of Belgaum, whose name has already appeared in this history (I, p. 327) to a native contractor. This contract had expired in July, 1869, and these forests had now come under departmental management. Shuttleworth's remarks on this contract were as follows :

"No surer way of destroying forests and denuding the country of trees could be devised than giving to a contractor permission to cut annually for a limited number of years an unlimited quantity of wood from the forests. It is naturally the man's first endeavour to cut and remove as much as he possibly can within the time allotted him, and to make every possible penny out of his bargain ; a ruthless and merciless destruction of trees ensues, everything is cut to the ground without respect to size or age, and with an utter disregard to future results."

In the past such remarks would have been disregarded or their truth called in question. Now they were supported by the authorities. The contractor apparently only paid Rs.695 per annum for his contract and appears to have made a fortune out of it.

As regards plantation work the Report gives evidence that a partial success had been obtained. But the failures were numerous and appeared to be chiefly due to inexperience and ignorance of the soil requirements of the species and of the sylvicultural characteristics of the trees made use of. All of which experience had to be bought. For instance, the only new planting work carried out in the Tanna Collectorate was undertaken in the railway fuel plantations in the Mahim and Danoo talooks. These fuel plantations had cost Government Rs.6759 in 1869-70. They had failed, though it was recognised

that the failure had not been through want of care and attention on the part of the Department. Mr. Williams, who was in charge, had visited and worked in them at all seasons, including the height of the monsoon, when the lower part of the plantations were 2 or 3 feet under water, and had spent no pains to ensure success. Bad soil and imperfect drainage, probably the latter one would think, were said to have defeated the efforts of the past year. Inexperience would seem to have been the chief cause of the non-success. For Brandis, after inspecting the plantations, suggested that the ridge and furrow system of planting, unknown in Bombay at this period, should be tried, and it was hoped thereby to obtain success.

An interesting feature of the Report is the section dealing with Nasik, which had been formed into a Collectorate during the year from portions of the old Collectorates of Khandeish and Nuggur, the Peint States being included in the new Collectorate.

Malaria was at this period a side of forest life which was not without its importance on the quality of the work done. It is commonly alluded to as interfering with the work in most of the Collectorates, and there appears to be little doubt that the total absence of accommodation, or of adequate communications in the way of roads and so forth, proved a serious drawback to forest life and work in the districts at this period.

The correspondence on the subject of "kumri" cultivation and fever had not completely died out, and the connection between the flowering of bamboos and the prevalence of fever had been discussed in this Presidency during the period here dealt with. The former matter had been dealt with, it will be remembered, by Mr. Shaw Stewart, Collector of Canara, in a Report dated 18th June, 1864 (Vol. I, p. 356). In this Report he stated that he did not think there was any connection between "kumri" cultivation and malaria. But in the previous April, Shaw Stewart had written to the Secretary to the Bombay Government saying that the recent prevalence of fever in Canara in the cold weather of 1863-4 might be due to the seeding of the bamboo during the past season. An extensive enquiry was therefore inaugurated by the Bombay Government which extended to Madras, Bengal and Assam, and resulted in a Memorandum being drawn up by the Secretary of the Agricultural and Horticultural Society. The conflicting opinions held at the time on the subject of the periodical flowering of the bamboo and its connection with the prevalence of

fever are of considerable interest. The Bombay views will be here summarised. Mr. Shaw Stewart stated his hypothesis in the following terms :

" No one can have travelled through the districts of late years without observing the wonderful luxuriance of the bamboos. Every clump was throwing out new shoots and all the shoots were covered with leaves. The presence of such an amount of vegetable life in excess of the usual quantity must have disturbed the atmospheric elements, and we all know what evil will be caused by a slight preponderance of any one of the gases we breathe. I cannot but think that fever is in some respects caused by this expiring effort of the bamboo before it seeds and dies, and that with the seeding and destruction of all full-grown bamboos, which is now taking place, the atmospheric elements will be restored to equilibrium.

I write this with great distrust of the correctness of my own observations, but I cannot help quoting the following facts in corroboration of this theory.

In those parts of the jungle districts visited by me where the seeding took place last season fever had almost entirely ceased ; new cases, I may say, had entirely ceased, and the only persons who suffered were those who had been attacked previously. Thus at Hullial, Bomunhully, Tuttihulla and other places where the fever was very bad last year, I found none in March and April of this year. But on going further to the west, to the Soopa and Woolwee jungles, where the bamboos had not seeded and were in full leaf, the fever was as bad as ever."

The Collector of Ahmednuggur reported in June, 1864, that the " tokur " or large bamboo had seeded very generally that year in Peint and in the " dangs " of the Collectorate, but that none of the other kinds of bamboos in these areas had seeded. For several months the poorer classes had been engaged in collecting the seed for food. He had had collected considerable amounts and had distributed them to be sown in selected sites. It had germinated readily, but as it was not protected from cattle he had little hopes of its coming to maturity. There had been no unusual prevalence of fever owing to the seeding. On the contrary, there had been an exceedingly virulent attack of fever in these areas in 1863-4 the year before the seeding.

Mr. Goldfinch, Collector of Belgaum, considered that the seeding of the bamboo had nothing to do with the prevalence of

malaria, the last severe attack of the latter having taken place three years before the general seeding of the bamboo in his Collectorate in 1864. The following extract from his letter bearing on the forestry question in Belgaum is of interest :

“ I think it equally clear that the fever has not been caused by the increase of the bamboo, because of my personal knowledge the bamboo and every other sort of jungle is not now one-half so extensive in Dharwar, the eastern border of Canara, or Belgaum, as it was twenty years ago.

When lately travelling through a portion of the Mysore country I was told in answer to my enquiries that the fever in the eastern portion of Mysore was not nearly so fatal as about Tilwully, Chickeroor and the western portions of the Khode talooka, where there is no jungle of any kind.

About the Yellgood, in Raichoor Division of the Nizam's country, where the hills are perfectly bare of jungle, and not a bamboo to be seen, the mortality from fever within the last two years has been almost as great as in Canara.”

Mr. Chapman, Collector of Satara, also considered that there was no connection between the seeding and malaria. He wrote :

“ Bamboos have seeded every year ; they are said to seed and die every sixtieth year, and the seed is used as food by the poorer classes in places where it can be got in sufficiently large quantities.”

The Collector of Poona, Mr. Morgan, wrote that in the areas in which the bamboo grew the seeding had been pretty general, and that it was the general opinion that the bamboo seeded once in every sixty years. He did not think there was any connection between the seeding and the prevalence of malaria.

The Acting Collector of Rutnagherry expressed the same opinion, stating that the bamboo had seeded very generally. For Dhawar the Acting Collector stated that the seeding had been only partial, and in the regions where it was most abundant it had not seeded. The popular opinion in the district was that the bamboo seeded every twelve years, and that the seeding time was marked by a famine in the country (an opinion held in Bengal though disproved by actual facts). The last seedings in the district were said to have occurred in the years 1832-3 and 1854-5, both years of average produce. The Collector did

not think there was any connection between the seeding and the prevalence of malaria.

The Government, in summarising the data, appeared to agree with the latter view.

The proposals for giving some training to the subordinate forest staff and of granting permission to members of the superior staff on furlough to visit continental forests for educational purposes, which have been dealt with at length in Chapter II, were met by a *non possumus* attitude in Bombay. On this point of view being intimated by the Bombay Government to the Secretary of State, that Minister (Despatch No. 56 of 1st May, 1868) desired to see the reasons alleged by the Bombay officers that it was impossible to train the natives of the Presidency for employment in the Forest Department, and why it had been decided that the study of forest operations on the Continent was totally inapplicable to the Presidency, and that the Government did not therefore propose to grant their officers facilities for carrying out such study. He pointed out that in other provinces, notably the Central Provinces, it was considered quite feasible to train a native staff; that a commencement had been made, and that the proposal to allow the superior staff to visit continental forests had been accepted.

In Bombay, Dalzell had expressed the view "that continental training in forestry will be of no service to Forest Officers employed in India!" Even for the stage at which Forest Conservancy had reached in Bombay, and the anxiety which the Government was displaying on the subject, some of the opinions expressed by their Forest and Civil Officers no this subject must be viewed with amazement.

The Conservator wrote that he considered the suggestion of training the native subordinates of the Forest Department as hardly suitable to the circumstances of the Department in the Presidency. He advanced the following reasons for the opinion expressed:

"This Department is unpopular among the natives, and is only resorted to as a last resource, and is immediately abandoned for employment on the same pay in any other Department; there is, therefore, very little ground for the presumption that the labour of training subordinates will not be thrown away.

The Conservator is of opinion, moreover, that the Bombay

Forests are not of such a nature as to be able to repay the trouble and expense of detailed scientific treatment. Even in the valuable forests of Canara, for many years to come, the practical management will be in the hands of the wild tribe called Wudders, who just know enough to enable them to cut down large trees, square them into logs and bring them into the depots.

With regard to the important branch of teak planting, scarcely any scientific training appears to be necessary. The Conservator has generally observed that the agricultural labourers of this country have very little to learn in any way of sowing and planting."

A rather remarkable statement for a Conservator to make.

Mr. Williams, a Deputy Commissioner, was on safer ground when he pointed out that owing to the low scale of pay of the subordinate staff better-paid services, railways and private companies, offered better inducements, and that the only result of training the staff might be to offer greater temptation to the men who trained to obtain more highly paid appointments outside the Department. He considered that the Central Provinces might be justified in recruiting a native staff, as the forests were healthier and the cost of living about a third of that in Bombay. The Revenue Commissioner, Northern Division, agreed with this point of view, considering that such training would be useless until a better scale of pay could be given. The consensus of opinion of both Forest Officers and Collectors of districts was against the necessity for training. Several pointed out that the first step should be the grant of better salaries. Even Shuttleworth, then a Deputy Conservator, held the same opinion. He wrote, "So far as the forests of the sub-Collectorate (Colaba) are concerned, I do not see that any deep knowledge of forestry or botany is required in their management. We have no large and compact forests, but scattered teak jungles all over the country, and to look after these requires no training. The four great requisites for native subordinates to possess are honesty, zeal, common sense and activity; these must be inherent, and cannot be instilled." In view of this expression of opinion it becomes obvious that little progress could be expected in the Presidency until it was equipped with a fully trained superior staff.

After a perusal of the views of the Bombay officials on this matter the Secretary of State held to his original opinion. He wrote (No. 14, dated 21st October, 1868) :

"These papers do not alter the opinion upon the advantage

of training natives for the Forest Service, and of giving facilities to Forest Officers to study the system of forestry on the Continent of Europe, which I expressed in the Despatch above referred to. You will, I presume, have made generally known to all Forest Officers the Resolution of the Government of India on the latter subject, dated and communicated to your Government on the 2nd of September, 1867."

THE FORESTS OF SIND

In the first volume of this history the Report of the Sind Forests from 1864-5 was considered, and details given of the satisfactory results which the Forest Department in that Commissionership had achieved. This progress was maintained during the following year, although the increase in net profits of Rs.3500 over the preceding one did not exhibit the actual financial outcome of the year. This was accounted for by the final settlement of the compensation to be paid for the land which had been taken into the forest limits, alluded to in Volume I, page 363. A sum of Rs.7600 had been paid for this land out of the profits of the year, which was a charge of a non-recurring nature; although it does not appear to have occurred to the Civil or Forest Authorities that the interest on this capital outlay should be charged to the account of the area purchased in this fashion. The following paragraph in the Commissioner of Sind's Review of the Report gives an insight into the various sources of the revenue of the Department at this period :

" There has been an increase in the items of ' Building Wood,' ' Jow,' ' Charcoal,' ' Fisheries,' ' Kahs,' ' Fines ' and ' Cultivation within Forest Limits ' ; whilst a slight decrease is apparent in ' Grazing Fees,' ' Firewood,' ' Reeds,' ' Grass,' ' Mangoes,' ' Lac,' ' Honey ' and ' Babul Pods.' Hardly any remarks are necessary beyond stating that the inundation was unfavourable to the growth of grass, that the steamers plying on the Indus have of late conveyed but little up-river freight, and have consequently consumed less fuel ; that the mangoes suffered from blight, and that in consequence of the improved irrigation of the older forests the supply of lac has decreased."

The Government of India and the Secretary of State had, to some extent, demurred at the step taken, with the sanction of

the Commissioner, of allowing cultivation within the forests limits, the Department realising revenue from this source. They had correctly considered that this was not a legitimate source of forest revenue. On the subject the Commissioner wrote :

“ The increase in receipts from cultivation within forest limits amounts to Rs.2,113. This item of income to the Department has increased from nil in 1862-3 to Rs.17,280 in the year under Report. Mr. Fenner's remarks on this head in paras. 20 and 21 of his Report show that the fears entertained by Government in their Resolution No. 3201, dated the 25th July last, that cultivation might probably injure the forests, are groundless.”

Mr. Strettell, the Assistant Forest Ranger (a designation now accorded to him instead of the former one of Inspector), an officer with a long experience of the Sind Forests, had raised objections to the new method of cutting in the forests on the system of successive coupes based on a fixed rotation, a principle which Brandis was uncompromisingly urging should be adopted throughout India. Strettell's argument was based on the fact that in some cases, with the constant change in the bed of the Indus River, areas of forests were swept away and thus lost to Government, and that when this danger became apparent such areas should be cut before the forest was lost. He appears to have considered that with this possibility confronting the Department the system of rotating the fellings should be abandoned altogether. On this and another matter the Government of Bombay in their Resolution (July 10th, 1866) wrote : “ The objections urged by Mr. Fenner ” (the Forest Ranger, who supported Strettell's suggestion) “ against the rotation system of cutting are apparently sound.

The area of the forest should, as suggested by that officer, be increased as much as possible consistently with the preservation of individual and village rights; and no opportunity should be lost for acquiring fresh land. The width of the existing belts might, perhaps, be increased by an additional expenditure on the construction of canals and water-courses. It cannot be too often impressed on all officers connected with the management of forests in this country, that present revenue is not so much an object as the future supply of timber and firewood.”

The Secretary of State (Despatch R., No. 72, dated 2nd

November, 1866) was not prepared to go quite so far. In connection with this matter he wrote :

" I observe that Your Excellency in Council, and the Commissioner, thought that Mr. Fenner's objections to the suggestion of Mr. Strettell, for cutting the forests by rotation, were sound, and doubtless they are so when they refer to such forests as are liable to be carried away by the river ; but systematic proceedings in the forests are necessary, in order to real conservancy, and I do not understand Mr. Fenner to deny that it is so in ordinary cases. I think, therefore, that it might be desirable that Mr. Strettell, whose long experience in Sind gives weight to his opinion, should be permitted to try the effect of rotation cutting in such of the forests under his charge as may not be subject to the encroachments of the Indus."

Apparently both Fenner and Stewart, Conservator in the Punjab, had drawn attention to the advantage to be derived from Chief Forest Officers visiting other forests than their own, so as to make themselves acquainted with the various systems at work, and acquire information from actual personal observation. The Secretary of State in the Despatch in question drew attention to this suggestion to which he gave cordial approval. It was a misfortune for the Department that this suggestion and the approval it met with in high quarters was lost sight of as the years went by and practically became a dead letter. Only now at the time of writing has its great value become realised in India. Much time would have been saved in the development of the Department, and much money have been saved in experiments carried on in one part of the country and repeated elsewhere with the same want of success, had the principle been followed. It is true that the long work of introducing a proper conservancy into the various parts of the country left Conservators and Divisional Officers with little leisure on their hands. But had officers, not merely as Conservators transferred to take charge of a Province, been deputed as opportunity offered or when deemed advisable with this object in view, it cannot be doubted that much good would have accrued thereby.

It appears from the correspondence of this period that in Sind the most cordial relations existed between the Civil and Forest Officers. The former co-operated whole-heartedly in carrying out the expressed wish of Government that when possible land should be transferred to the Department to

increase the forest area. During 1866-7 more land was transferred for conservancy purposes, and it was in contemplation to make the transfer still more useful by forming the separate patches of forest into continuous tracts.

The revenue during the next two years showed some diminution, owing to the smaller consumption of fuel by steamers on the Indus, one of the companies having gone into liquidation, and to the smaller demand for building materials due to the depression of trade in Bombay at the period. Strettell had been promoted and transferred to Berar. His loss was a severe one, as he had been carrying out for some time with successful results experiments in introducing exotic trees into Sind at a nursery established near Sukkur in Upper Sind.

Brandis had made a tour of the Sind Forests in 1867-8 and had suggested the establishment of depots for the sale of wood as likely to be advantageous. His Report, dated 24th July, 1869, is a most instructive document. The Commissioner fully agreed with Brandis in this matter, and had requested the Forest Ranger to establish a depot at Kotri at once and notify the fact widely "so that merchants may purchase there, and adopt their own measures for transit to Kurrachi, where wood of all descriptions is in very great demand, and commands high prices. A little experience and further enquiry would show whether it was expedient to form a depot at Kurrachi itself. Large quantities of wood lie waste now in the Government forests, or are lost in the river, which might be disposed of under a good system. In fact, the magnificent babul forests of Middle and Lower Sind may be said to be comparatively useless. Very little is used for steam fuel, owing to the tamarisk, or 'kundye,' being so much more easily cut, and obtained nearer to the wood stations."

The question of providing sleepers and fuel for the Indus Valley Railway was occupying the attention of Government, as was the case at the period in the Punjab, North-West Provinces and elsewhere. Arrangements had been made by which Brandis was to exercise, through the Forest Ranger, supervision and control of the operations for providing these sleepers and fuel.

In his Report Brandis stated that at the period the Sind Government forests promised several great advantages over the State forests in other provinces in India. As a rule they were well demarcated and had well-defined boundary-marks, and they

were not burdened by any customary or prescriptive rights of the neighbouring population. Upon the whole they were fairly stocked with trees and shrubs ; the rate of growth and natural reproduction were very good, and under regular management he considered they would be found capable of yielding a very large supply of materials. The chief disadvantage was that the local demand was small and that but little forest produce was exported.

In August of the same year we find Brandis writing a note with reference to the supply of timber and fuel for the new railway line from Multan to Sukkur, 300 miles in length, for which 600,000 sleepers would be required, as well as large amounts of fuel for the locomotives. The first source of supply of the sleepers would be the babul forests of Southern Sind, a sketch of which forests was contained in Brandis' Report. A regular plan of operations would be required to work these forests properly, as also other areas. It was to draw up such a plan that Schlich was transferred to Sind from Burma. The other source of supply was the Punjab Forests, but they already had to meet the drain upon them for the Punjab railways. The Sind Forests would also have to supply large amounts of fuel from the tamarisk and jhand (*Prosopis spicigera*) Forests.

The year 1869-70 was noteworthy in the history of Forest Conservancy in Sind by the fact that two home-trained Assistant Conservators of Forests, Messrs A. Pengelly, B.A., and Framjee Rustomjee Dasai, it is believed the first trained Indian to join the Forest Department, reported themselves for service. They were sent there to aid in the work connected with the Indus Valley Railway supply. Schlich, who had been transferred from Burma, only arrived in Sind in April, 1870, after the close of the year.

Mr. Pengelly speedily showed his capacity by drawing up a Report on the " Wasting of the Banks of the Indus." This Report received favourable commendation from the Secretary of State. At this period no attempt of any value had been made to train the Indus. The banks became undermined and dropped into the river at one point, and the silt was carried down and formed a new bank at some point lower down. There were constant disputes over these new-formed banks, although a very clear set of rules for alluvion and diluvion were in force in Sind which made it quite clear to whom the new land should belong. Fenner appears to have been dissatisfied with the rules for several years, and had on several

occasions appropriated to the Forest Department land to which it had no right on the ground that the silt carried down and forming the new addition was derived from forest land. In this he was not upheld, as the rules awarded the new-formed land to the owner of the land upon which it was deposited, or in the case of an island in the neighbourhood of which it was deposited. Pengelly put forward proposals with the object of preventing the washing out of banks and the undermining of small cliffs; a process which was constantly taking place, resulting in valuable forests being washed away, as also agricultural land, the latter's leasing value owing to this risk being lower. The formation of sand-banks and the constant changing of the river-bed also rendered its navigation more difficult; whilst the trees swept into the river remained, in many cases, in its bed as snags and thus became dangerous to boats. Pengelly had seen the way the Rhine had been trained, and whilst realising that the methods of Europe might not be applicable to Sind, he suggested that the main idea, that of forming the banks into an inclined plane projecting out into the river to some distance beneath the water might be tried. In the case of the Rhine the sloping bank so formed was further strengthened by faggots of brushwood. He suggested that the faggots might be replaced by a coarse matting pegged down in the manner it was used to secure canal banks in Sind. He summed up the advantages to be derived as a considerable saving in wood yearly lost by wash-outs in the river-banks. He pointed out that this was serious even in a young tamarisk wood of two years' growth which, though of no market value at that age, was a loss "which may be stated as the present value of the sum which would have been realised when the wood became fit to fell"—an argument based on forest valuation which it is to be surmised could have been understood by few in India at the time. But the loss of mature babul forests was even more serious, whilst the trees hindered the navigation of the river, silting up channels and costing money to remove. Further, Pengelly pointed out that the application of the rotation system would be facilitated. The zemindars would also be greatly benefited, and the leasing value of their land be increased if greater security could be given by training the river to some extent. The river Conservancy Department would then become a preventive instead of merely a remedial one. He recognised that the cost would probably be heavy, but suggested that an experiment should be made. The

Department was subsequently authorised to carry out the experiment on one of the forest frontages of the river, the cost to be debited to it. It was pointed out, however, that the Department should carefully watch the action of the river when it was threatening valuable forest and cut and remove the trees when it seemed likely that they would be carried away during the next flood season.

The Budget for 1869-70 showed a deficit which was, however, partly accounted for by a heavy charge incurred on the survey of the forests, which would be non-recurring, and by the increase in salaries owing to the two lately joined officers arriving from England. But the chief cause in the falling off of the revenue appears to have been due to the fact that Fenner had fixed his prices for sleepers and fuel too high, giving cause for considerable complaints.

The Commissioner, in reviewing the Report, dealt as follows with these matters :

" Complaints have been made during the year by the Indus flotilla, and with reason, regarding the high price of fuel supplied by the Forest Department, viz., Rs.18.8 per 100 maunds (27 maunds equal 1 ton). Mr. Fenner reports that the cost of placing this at the wood stations ready for use is as follows :—

	Rs.	a.	p.
Cutting	6	0	0
Average boat-hire to station	5	0	0
Average cost of shifting on change of station	2	12	0
Cost of establishment	1	0	0
Loss by deterioration and other causes	1	4	0

Total per 100 maunds Rs.16 0 0

Royalty ditto. Rs. 2 8 0

The second and third items are pitched at high rates, and might well be reduced to Rs.4 and Rs.2 respectively, while loss by deterioration might safely be placed at Rs.1. This would make the rate Rs.14 per 100 maunds, and the royalty charged at Rs.2, or more than 6 per cent, would give a selling price of Rs.16, instead of Rs.18. The advertised price of fuel at Kotri for the general market is Rs.20. This might be reduced to the same as for steam fuel, and would assuredly command a larger sale than at present.

The question of the price of sleepers supplied from the forests has also been under discussion. At a meeting of the Sind Railway, held at Kurrachi on the 11th of February last, it was recorded that the Forest Ranger in Sind had offered to supply the Company with 8000 sleepers at Rs.3 for a first-class sleeper, and Rs.2.8 for second-

class, provided the whole number were taken. As the Company were not in want of so large a number of sleepers the offer was declined, and that of a native to give 100 (? 1000) well-seasoned sleepers for Rs.2 each was accepted. Mr. Fenner, on being called on to explain how it was that the Forest Department was thus undersold in the market, stated the following to be the prices paid by the Department for first- and second-class sleepers delivered at Kotri:

	Rs.	a.	p.
Average cost of first-class sleepers	1	11	0
Add royalty (nearly 80 per cent)	1	5	0
	<hr/>		
	3	0	0
Being at the rate of six annas per cubic foot.			
	Rs.	a.	p.
Second-class sleepers	1	8	8
Royalty (nearly 70 per cent)	0	15	4
	<hr/>		
	2	8	0

or 4 annas and 4 pies per cubic foot. The royalty thus charged would seem to be excessive, and to render private competition in the market easy and remunerative; considering that the growth of babul timber is being greatly extended in Sind on private estates, it seems certainly advisable that the Government rate should be reduced, and that Rs.2 for first-class, and Rs.1.12 for second-class, would be more suitable. This is the more worthy of consideration, as there will shortly be a very large demand for sleepers for the Indus Valley line; the Government forest should be prepared to give them at the lowest possible rate."

A meeting was held at which the Commissioner, the Heads of the Railways and the Forest Ranger were present to discuss this question. As an outcome, by reducing costs and the royalty to Rs.2, the selling cost of fuel was reduced to Rs.16 per 100 maunds. But the railway authorities were not without blame in the matter, as many merchants had complained that the high rates charged by the railway for carrying firewood to Karachi were prohibitive to trade in this article. The railway authorities were therefore requested to consider this matter.

On the subject of sleepers the agreement come to was thus explained by the Commissioner to Government:

"In the cost of cutting, all done now by hand, there cannot at present, I think, be any reduction effected, though there may be hereafter, when machinery is brought into play as is proposed. But in the royalty something may well be taken off, when it is noted that on first-class sleepers it is nearly 80 per cent on the cost of cutting, and on the second-class nearly 70.

The timber is property belonging to Government, and has of course its value. But that value is only what the material is worth in the market, and if good sleepers will not command a sale at Rs.3 each, it is clear the price is too high. At a lower rate, it is reasonable to suppose that with the extension of railway communication in India, the stock of sleepers instead of remaining on hand, as is the case now, would be bought up and exported. It is true that there will be during the next few years a large demand for sleepers for the Indus Valley line ; but as that is, I understand, to be constructed by Government, keeping up the present rate would be only taking money in one Department to pay it out in another, and would not improve the general sale of an article which Government has at its disposal, and from which I am confident much larger returns might be derived than is the case now.

I have already expressed my opinion that the existing forests of Sind are quite equal to the demand which the Indus Valley line will bring upon them ; and from a personal knowledge of them I am convinced that thinning, judiciously managed, will be of great benefit to them, using up trees which have come to maturity, and in many instances lying cut in the forests, while with replanting arrangements properly carried out a continuance of the production of useful and valuable timber may easily be maintained. I can conceive no limit to the growth of babul in Sind, except as regards the area that can be spared for that purpose, and its limits are far from being approached. The soil, climate and water supply are particularly well-adapted to it. Wherever the seed is deposited, and a fair amount of water given, the tree thrives of itself. The precarious nature of existing forests alluded to by Mr. Fenner in previous correspondence refers to the forest fronts which are now effected by the erosive action of the river. This may be remedied, or at all events the grown timber may be saved from falling into the river, and being partly lost, by timely cutting, while, as this course has to be followed, new plantations can be formed and the forest renewed at leisure.

I would, therefore, beg to recommend that the royalty now charged on sleepers be reduced, and that the Forest Ranger may be authorised to offer them for sale at the following rates :

	Rs. a. p.		
First-class, each	2	0	0
Second-class, each	1	12	0.

The Government of Bombay in a letter of four lines gave approval to the new rates for twelve months, at the expiration of which period they were to be revised if necessary.

The Secretary of State (the Duke of Argyll), however, discussed the proposed changes at somewhat greater length, treating the matter rather from the point of view expressed by

class, provided the whole number were taken. As the Company were not in want of so large a number of sleepers the offer was declined, and that of a native to give 100 (? 1000) well-seasoned sleepers for Rs.2 each was accepted. Mr. Fenner, on being called on to explain how it was that the Forest Department was thus undersold in the market, stated the following to be the prices paid by the Department for first- and second-class sleepers delivered at Kotri:

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CHAPTER V

THE PROGRESS OF FOREST CONSERVANCY IN BRITISH BURMA, 1865-1870

A SERIOUS attack was being made upon the system of management of the forests of British Burma introduced by Brandis whilst Superintendent of Forests in that Province. This system has been already described in Volume I, Chapter XX. On the part of the licensees and timber exploiters the agitation was voiced by Mr. Wallace, and it found support from Brandis' successor in charge of the forests, Mr. Leeds, now termed Conservator. The representations made traversed the whole foundation of the methods of management introduced, and aimed at reverting to a great extent to the methods which had ruined the Attaran Forests, by allowing the Contractors a free hand in selecting the trees they wished to fell and thereby putting an end to Brandis' system of control. In perusing the mass of correspondence on this subject it becomes very evident that Leeds had not assimilated the principles of true Forest Conservancy. As has been already mentioned, Brandis had a stiff fight to resist the new proposals ; and to avoid the risk of losing all the good work he had accomplished in Burma he had the tact and statesmanship to give way as far as he justifiably felt it possible to go.

It will be necessary to glance briefly at the Memorandum he wrote on this subject (dated January, 1864) soon after his departure from Burma.

Leeds argued that it was necessary to afford every facility to ensure that the forests should be worked in their present condition so as to make them remunerative. The present arrangement, he asserted, had ruined many Contractors, many were working under difficulties, and if the present systems were persisted in the majority would become disgusted and the working of the forests would come to a standstill. He was of opinion that the forests were not being improved, that the best

timber for the market was not being obtained and that the difficulties and expenses in working the forests were ruinous. He contended that the peculiar constitution of the forests, with the scattered nature of the teak trees in them and the difficult configuration of the country, made it impossible to carry out a scientific system in selecting the trees. Further, that the work of improving the forests by planting, protecting seedlings and other forest work had been neglected during the preceding seven to eight years (i.e. Brandis' regime), during which millions of young seedlings had perished through want of attention; that the forests had been protected, but not improved. That because the net revenue from the forests was small, and the work in the forests harassing and tedious, the strength, time and money which was then spent on girdling operations should be saved and devoted to the work of improving the forest. That thereby a saving of Rs.10,000 could be effected annually, sufficient to entertain three additional European officers. Finally, that these "reforms" would enable those who worked the forests, i.e. the Contractors, to bring down better timber and at less expense than at the time, as the Forest Department was unable to command the girdling of the best timber in sufficient quantities and in localities most easy of removal. Specious arguments, which required the knowledge of the scientifically trained officer to counter. Leeds considered that his objects could be attained by leaving the selection of the trees to those who had to remove them, and that the work should not be done by the Forest Officers and hired labourers working under their supervision. In support of his views the Conservator, with extraordinary obtuseness, instanced the destruction of the Attaran Forests, stating that this destruction was not so much due to the license-holders themselves as to the total absence of a Forest Staff to supervise their work—"that all was confusion, and that ignorance produced destruction as cause produces effect." From the history of the Attaran Forests, already detailed, the inaccuracy of these conclusions can easily be substantiated.

Leeds proposed to place the selection and girdling of the trees entirely in the hands of the Contractors and permit-holders under certain fixed rules, the chief being that no trees under 5 cubits in girth should be felled, and he considered that it would not be worth the Contractors' while to kill small trees, and that with good supervision it would be easy to



A TYPICAL EXAMPLE OF A MINED FOREST, BURMA

P. W. S. 1/1/48

prevent this. This argument is so fallacious when the previous thirty years of the history of these forests is considered, and in view of the enormous extent of country to be supervised and the small staff as yet in existence, that it is difficult to distinguish any difference between the ideas held by Leeds and those expressed by the Contractors themselves. Mr. Wallace explained the views of the Contractors and permit-holders. His chief arguments were as follows :

The system in force was designed with the object of extending the girdling of the trees which were already fit for removal over two generations, the result being that trees now fit for girdling would pass their prime and decay before the forests were revisited. Further, that the timber would not bear the heavy expense of removal unless the trees stood reasonably close together ; that the girdling done by the Department could not be relied upon to secure only such trees as were valuable and standing sufficiently near water-courses. In other words, Wallace only wanted easily accessible trees girdled and wished to clear out all such to the ruin of these areas, the rest of the more inaccessible forests being left untouched—in effect, to go back to the old state of affairs. This is evidenced by the next argument, that, to give a finer supply of valuable timber the duty of girdling must devolve on the men of the jungle who, whilst engaged in felling and removing other trees, could without difficulty girdle timber to any extent ! Wallace expressed the opinion that a continuance of the system of girdling by the Department then in force would result in the entire abandonment by private parties of forest working in British territories, as it could not be carried on profitably. The arguments used, though fallacious, were ingenious and formidable, when it is remembered that Government were always keenly interested in obtaining satisfactory supplies of teak timber, and required delicate and skilful handling to meet them. Wallace then proceeded to make use of the arguments enunciated by Leeds on the subject of the real duties of the Forest Officers—arguments which, coming from a timber Contractor only interested in exploiting the forests up to and beyond their full possibility, weakened instead of strengthening his case.

Brandis had little difficulty in refuting some of the contentions put forward by Leeds and Wallace. The former maintained that the felling of all good marketable trees, to be left to the Contractors to undertake at their own sweet will,

would have the same effect on the forests as the prescribed selection of one-fourth of the first-class trees at the time in force. Brandis admitted that in some forests this might be the case, but that Leeds' contention was not based on an accurate knowledge of all the forests. He quoted an instance of valuation surveys made in the Toung Choung Forests, mentioned by Leeds in his Report for 1862-3. These surveys gave 1086 trees above 7 feet 6 inches in girth out of 1780 first-class trees. In such a locality it would not be prudent, said Brandis, to fell all the first-class trees even if the size was restricted to 5 cubits. Therefore, in applying Leeds' rule to practice, restrictions and limitations would have to be at once brought in. Brandis added that he doubted whether Wallace and the other permit-holders would be satisfied with any rule fixing 7 feet 6 inches as the minimum size. Experience had already shown on too many occasions in the past that Brandis' fear was correct. It would have only been the thin end of the wedge. Brandis was fully cognisant of the real state of affairs and that the Local Government was, at least partially, on the side of their Conservator and the permit-holders, and he was tactful enough to recognise the danger of a downright *non possumus*. He concluded his Memorandum as follows :

" In closing this Report I wish to express my regret that I have been obliged to maintain views which are opposed to opinions earnestly expressed by the present head of the Forest Department in British Burma. Mr. Leeds' views appear to be based on an incomplete knowledge of what conservancy requires. It would be a misnomer to designate any forest management as conservancy which does not enable us from time to time to take stock of the timber killed or felled in a certain forest district and the trees remaining.

At present a register of all trees girdled is kept, or ought to be kept, for every forest district under conservancy management in Burma. If Foresters were allowed to girdle what trees they chose above a certain size, simultaneously in all the forests, such registers with reliable figures would not be possible. We should be entirely in the dark as to whether a forest is deteriorating or not.

An accurate and detailed register of the trees girdled annually in every forest district, checked by the yield of timber, is the basis of a systematic management at the present time, and furnishes the data for an improved system hereafter. Had

we to deal with pure and compact teak forests, it would not be requisite to register every tree killed or felled ; the forest records show the areas and their growing stock, to which the annual felling operations would extend. But as the forests in Burma are constituted at present we must enter in our registers the number of trees removed. It is a cumbrous process, but necessary at present if conservancy is not to be a name only.

I regret that I do not see how the interests of the permit-holders and those of conservancy can be made to agree with each other. Permission to girdle all trees above a certain size would certainly tend to make the working of the forests less expensive, the profits would be larger, and the risk of loss through a sudden fall in the price of timber would be less.

These advantages, however, would be purchased at the risk of seeing the supply of timber from our forests diminish suddenly after the lapse of twenty or thirty years, at a time when possibly a largely increased supply from the British forests may be most desirable.

I have indicated some of the ways by which the interests of permit-holders can be furthered without endangering conservancy. The safest course to take will be to concentrate strict systematic conservancy management on a smaller area, and to give away more forests under leases with permission to girdle. But absolutely to reconcile the interests of conservancy with those of the permit-holders is, I fear, a hopeless task in the present state of the forests of British Burma. Any attempt to effect this would only lead to half measures, which would inevitably tend, in course of time, to ruin the forests."

The Chief Commissioner himself refused Wallace's renewed application to be allowed to select and girdle the trees in the forests he worked in. Brandis' main principle that this selection and girdling should remain in the hands of the Department was therefore upheld, the Government of India supporting the Chief Commissioner of Burma's opinion that this work should not be placed in the hands of the Contractors.

Some changes were made in the classification and scale of charges to be paid in future for teak timber. The Conservator had suggested that the permit-holders should be compelled to form a plantation of a certain number of acres every year, at spots indicated by the Forest Officers. But the Government

were not inclined to accept this rule, in view of past experience in this direction.

The Report of Forest Administration for 1864-5 affords a considerable insight into the work being carried out in Burma. Forest reserves to the extent of 40,000 acres had been demarcated and the destructive practice of *toungya* (shifting) cultivation strictly forbidden within these limits. Various other measures for the improvement of teak had been instituted. It was proposed to select and demarcate other forests year by year.

The importance of forming teak plantations was urged by the Government of India, and they considered it advisable "gradually to form plantations in suitable sites on the banks of the navigable rivers where teak formerly existed." The Nilumbur teak plantations were again quoted as an instance of the success attainable by this work, and it was considered probable that the Karens would readily take up the new industry. The use of the term "industry" to this work discloses the fact that at this period it was still not fully appreciated that the chief desideratum in connection with new plantation work was the existence of a staff who understood the business, and that other essential that the plantations once formed could not be left to look after themselves. These factors were to receive inadequate appreciation in the different provinces for some years to come, and much money was to be wasted owing to the ignorance existing on these points and the want of knowledge of the varying requirements in different localities of the species of trees made use of.

Considerable trouble had been experienced in the past in the management of the Government timber station at Kaddo on the Salween River near Moulmein. Great improvements had been effected here and also in the collection of the drift timber which was now under Government supervision. A large proportion of the logs, which from various causes got adrift from the rafts and had formerly been either stolen or carried out to sea and lost, were now salvaged; 7778 teak logs had been salvaged during the year in question. It will be remembered that such operations had been recommended by the Commissioner, Broadfoot, as far back as 1843 (I, p. 172).

Blasting operations were being actively carried out to render the beds of some of the hill streams useful for floating operations by removing obstructions. These operations were to be extended, and it was pointed out that they would not only

facilitate the transportation of timber, but also of general merchandise, and thus be useful in the interests of the community at large.

As a result of widespread enquiries which had been instituted on the subject of the best period to allow a tree to season after girdling, and in conformance with the general trend of the opinions expressed, this period had been reduced during the year from three to two years.

As an experiment, which was in effect the outcome of suggestions which had been made a number of years before, one division of the forests of the Upper Salween River had been leased out to Karens of influence for a period of six years. This step had been strongly advocated by Brandis. The Secretary of State heartily approved of the departure, but added: "The result of the management of these forests should be carefully watched, in order to ascertain whether it is sufficiently good to make it desirable to renew these leases when the present term is over."

The question of the best way to deal with the permit- (*lethmat*) holders in the Attaran Forests had been under consideration. It had become necessary to regulate in some manner the position of the permit-holders and to ascertain definitely the *bona fides* of all those claiming what had become a prescriptive right to work in certain forests. It will be remembered that these permits originated with the system introduced by Mangy, Commissioner of Tenasserim, soon after the annexation of the Province (I, p. 140). British Burma was now under a Chief Commissioner, and Colonel Phayre had been recently appointed to the post. He had profited by his long experience in Burma, and now held different opinions on the value of the forests and their management to those he had expressed in the days of McClelland.

The Conservator of Forests had been ordered to carry out a careful enquiry into the position of the existing permit-holders. On this enquiry Phayre wrote a Review, dated August, 1865. The whole subject was dealt with in a letter (No. 265 F., dated 13th July, 1896) by the Government of India.

The Chief Commissioner's Review stated that only one original permit was produced, the others were said to have been destroyed, together with the original register, during a fire which occurred in the house of the Superintendent of Forests in Tenasserim (Mr. Gemmer) in 1854. Ten claims were put in to 31 forests situated on the Wineyo and Zimmé branches of

the Attaran River. The chief points about these original permits, which were issued between the years 1832-42, were that they were authoritatively issued by Government Officers, giving permission to cut teak timber of a certain size in the Attaran Forests. The locality was, however, never mentioned in the actual permit, but appeared to have been pointed out on the ground by a "Forest Officer" (such individuals did not really exist in those days) who was indicated by name in the permit. Of course, at the period of the enquiry, most of the so-called Forest Officers were either dead or not traceable. It was maintained that the absence of the original permit should not be held as violating all claim by those who could show a fair probable title to work certain forests. The Chief Commissioner, moreover, considered that most of the areas were now useless as teak forests. He wrote :

"One thing is very certain, that the so-called forest tracts now in question are not likely ever to be of use to Government as teak forests. They have been thoroughly worked out, or too much denuded of teak to render them worth having a regular forest establishment maintained for them. The Chief Commissioner considers, therefore, that to push the Government rights over them would be generally of no use, while it would be in some instances a real grievance to those who have acquired through long years a *quasi* prescriptive right to work in them."

This opinion does not coincide with the work of the Department in every part of India during the following fifty years, work which has restored many ruined forests to a flourishing condition.

The Chief Commissioner's summary of the matter was as follows :

"After full consideration of the whole case of the holders of these permits to cut teak timber in the Attaran Forests, which has now been under consideration and reference for ten years, the Chief Commissioner comes to the following conclusion :

1st. Those persons who originally received permission to cut teak timber in the Attaran Forests have no absolute rights to territorial tracts, or to anything beyond the right to cut teak timber.

2nd. But certain tracts having been pointed out to certain parties holding *lehmats* or permits, they or their successors for a long series of years continued to cut timber within certain

limits. The majority of those who have ceased to do so have apparently done so in consequence of a prohibition from the local authorities.

3rd. The holders of *lethmats* have, by tacit consent of the local authorities, acquired and held exclusive right to cut timber in certain localities, and the timber derived from such localities has been brought down to Moulmein, and there paid duty to Government throughout a long series of years.

4th. It appears now only right to acknowledge the rights of the original permit-holders and their successors. It is true that no permit-holder has taken any care to fulfil the duties imposed by rules issued in 1841 and 1842, but at the same time, beyond the mere issuing of those rules, no steady and continuous measures were adopted for enforcing them. It seems, then, hard to visit with penalties, breaches of rules which no effectual care was taken to uphold.

No *lethmat* or permit given in is of an earlier date than the year 1832, and none is later than 1837. The Chief Commissioner, therefore, as a general rule, would acknowledge all permits to cut teak timber on the Attaran River as being on the 1st of January, 1865, thirty years old. In consideration of the long time these permit-holders have been allowed to exercise their privileges, and because, also, the tracts in question would really be useless to Government as teak forests, he would recommend that a distinct alternative be given to each claimant as follows :

He may either have a second permit to run for thirty years, giving him the right to fell teak trees of 5 cubits in girth at 6 feet from the ground, and subject to payment of duty when brought to Moulmein as heretofore, or he may take the whole forest tract within which his claim to cut teak timber is proved at Rs.2½ an acre, including all rights to teak and other timber ; the land, in fact, to be then his own in fee simple. The Chief Commissioner would not allow any claimed tract to be divided into parts for the purpose of thus being purchased. In the event of any permit-holder accepting a permit for thirty years, the tract at the end of that time will revert to Government ; should permit-holders refuse to accept either alternative, the permits to be at once withdrawn, and the forest to be at the disposal of Government.

Should any of the forests thus remain in private hands, or, indeed, in any case, it will be necessary to have an establishment to watch them, which will be settled hereafter. The Chief

Commissioner also begs to recommend a temporary establishment to survey the forest tracts claimed. The establishment would be : Surveyor for six months, at Rs.400, Rs.2,400 ; travelling allowance, Rs.600 ; coolies, peons, etc., Rs.400 : total, Rs.3,400 ; and as recommended by the Officiating Conservator.

The only points now remaining to be noticed are, with respect to the Government Reserved Forests, called the Upper Mittigate and the Thinganeenoung.

As regards the first, Mr. Leeds' Report and opinion will be seen in his Paper II on that subject. The value of the forest is evidently much less than when visited by Dr. Falconer in 1849. The forest cannot be considered a valuable one, because there is an absence of seedlings, as observed and explained by Dr. Brandis. The only plan to adopt with this forest is to work it by permit-holders and the same general plan as that adopted for the forests of Pegu, that is, to give permits for three or more years at a minimum rate of annual revenue and fixed price per log to be tendered for. This has, in fact, been already done. But this forest being on the Siamese frontier, where banditti have of late been troublesome, people are unwilling to undertake to work it. Still, it might again be worked on that method when the frontier is quiet.

In regard to the 'Reserved Forest' of Thinganeenoung, as observed by Dr. Brandis, it has never been reserved, except on paper. In short, from want of establishments duly kept up, and want of continued supervision, without which a forest in a remote place is at the mercy of all woodsmen, the trees have been cut down by those having *lethmats* for adjoining forests, and it not being known where the logs had been cut, duty was, as a matter of course, taken on them on their arrival at Moulméin. There is nothing of value now to cut but a few trees which may be preserved for future use."

A nursery had been formed in 1856 in a portion of the Thinganeenoung Forest. After a thinning here Leeds estimated that only 200 well-grown trees would be left. Although soil here was favourable for teak the locality was said to be too remote to enable it to be properly superintended. It was therefore decided that no further work should be undertaken in this locality.

The Government of India, in their letter above noted, agreed generally with the Chief Commissioner's proposals and left

the matter to his discretion. The grantees were to conform strictly to the rules laid down. On the subject of the replanting work they were to undertake, a work which had been entirely ignored in the past, the Government of India wrote: "By planting it is to be understood that at the end of the 10th year there must be 5 acres covered with promising teak trees of 5 years' growth; at the end of 15 years there must be 10 acres, and at the end of 20 there must be 15 acres as follows: 5 of 15 years, 5 of 10 years and 5 of 5 years' growth, and similarly at the end of the 30th year, the Conservator to be the judge of the proper fulfilment of this work. The object of the Government is to perpetuate the growth of teak, which shall be the property of the 'lethmat' holders, if the conditions are complied with and the 'lethmat' renewed. All forest tracts to which no claims are established, and all those for which claimants may refuse to accept the new 'lethmats,' should be reserved by Government."

The staff required to survey and define the boundaries of these "lethmats" was sanctioned.

Little progress appears to have been made with the work of reserving and demarcating forests during the year 1865-6. The Government of India drew attention to this fact requesting that every exertion should be made to ensure steady and rapid progress of these operations. In the previous year it had been stated that the total area demarcated in the Tharrawaddy District was about $40\frac{1}{2}$ sq. miles, and that pending the final decision of the Chief Commissioner regarding the reservation of the forests, "toungya" cultivation had been provisionally stopped in the area for one year. No allusion was made to this work in the Report of the following year. The work of blasting rocks in the beds of the mountain streams, commenced in 1861, was said to have been nearly completed. Teak plantation work had made but slow progress; some cutch (*Acacia Catechu*) trees had been put in. The Conservator correctly stated that this work required trained officers, but the Chief Commissioner considered the work so pressing that the Forest Officers in the districts should be stimulated to pay due attention to it. Phayre had not yet learnt apparently, in spite of his long experience of the forests, that forming plantations of a rapid-growing tree like teak was merely throwing away money unless the work could be adequately performed in the first instance and the plantation properly supervised subsequently.

The yield of timber during the year, 40,081 tons, was the largest recorded from the Province of British Burma since its formation. The yield of the teak forests beyond the British frontier amounted during the year to 126,382 logs and 13,742 converted pieces. With reference to these amounts of teak from foreign territory the Government of India wrote : "No complete accounts are available of the timber drawn from foreign territory since the commencement of the Moulmein timber trade, and I am to suggest the preparation of a Report showing, from as early a date as practicable, the quantities imported annually into the British Provinces of Burma from the different foreign territories. But so much is clear, that this quantity has hitherto been steadily on the increase, and that, as Mr. Leeds correctly observes, this increase of yield cannot last very long. Some of the teak localities from which Rangoon and Moulmein have hitherto drawn their supplies must sooner or later become exhausted. Bearing in mind the uncertainty of this supply, it will be apparent that great efforts should be made to increase the future yield of the forests in British territory, and this, His Excellency in Council believes, can only be effected by gradually transforming the best existing teak localities into compact forests. At the same time, should it be found necessary for the attainment of this object to reduce for a time the yield of the forests in British territory, this ought to be done. His Excellency in Council observes that the period of 12 years, for which provision was made in the plan of operations, ends this year, and that a revised working plan will now have to be prepared ; and I am desired to state that, in determining the yield of the different forest districts, due regard should be had to secure for the future an increased yield of timber from the British forests."

The cash receipts during the year amounted to Rs.8,98,628, the disbursements to Rs.3,12,066, the net revenue being Rs.5,86,562.

The Conservator had made an interesting experiment during the year "in collecting logs of the wood called 'Pyengadoc' (*Xylia*) for railway sleepers." "The Report," said the Government, "as to the quality and the price (Rs.3 each in Rangoon, when taken in large quantities) is very favourable." Leeds had also suggested that permits should be granted to cut timber other than teak. The Chief Commissioner, however, contended that this would, in fact, be a prohibition to cut

timber (other than teak) to all save the permit-holders. It was not intended to interfere with the people obtaining their *bona fide* requirements in timber, fuel or bamboos, but to save the indiscriminate hacking to which the forests were subject (with the exception of the teak trees) to supply the markets with the materials they took for boat-building, cart wheels, etc. The value of these latter articles had increased greatly, owing chiefly to the increased cultivation of rice brought about by the establishment of a stable government. The valuable woods used for these purposes were becoming scarce and the Conservator correctly wished to restrict the cutting. The Chief Commissioner demurred, however, considering that any restrictions of this nature would produce general alarm and discontent unless greatly limited. This opinion coincides with some of Phayre's remarks on McClelland's Reports on the Pegu Forests which have been already dealt with in Volume I. The Government of India intimated that they awaited a further Report on the matter with interest, and the Secretary of State agreed that the question required careful consideration "so as not to give just cause of discontent to the people of the country by infringing rights which they have immemorially enjoyed. It is at the same time necessary that teak should be economised by the use of other woods whenever possible. I think that some means will speedily be brought into use for preventing unnecessary waste of every description of useful timber." But this hope was to take a considerable period to realise!

The correspondence at this date brings out very sharply that the authorities, the Government of India (the Secretary of State with no personal knowledge of the country could not be expected to grasp the fact) and the Heads of the Provinces and Local Administrations were very far from realising the gigantic and arduous nature of the work entailed in exploring, selecting and demarcating the areas which were to form the future Reserved Forests. The tracts themselves were very large, often situated in a difficult roadless country with a climate which made prolonged exposure and continuous marching a most searching tax on the physical powers of the European. In those days there was a total ignorance of what the conditions of a Forester's life entailed, even amongst the non-forest officials who as keen sportsmen devoted all their leisure to big-game shooting in the jungles. In those halcyon days big-game was plentiful and the sportsman had not to go

very far in search of it. Moreover, his shooting trips were only interposed between the performance of his ordinary official duties, and were regarded as delightful interludes. He did not spend months on end enduring the strenuous life of the Forest Officer, often with inadequate food and always with the poorest of accommodation in all types of weather. To have a small tent as house for months on end may sound delightful to the inexperienced. But those who have had to occupy such a home throughout the hot weather months or during the drenching rains of the monsoon will know that the glamour soon wears off and the hardships far outweigh the pleasures of such an existence. All honour, therefore, be accorded to the men—the pioneers of the Forest Service who lived these lives, many to either die in harness or to return home prematurely with their health shattered, in order to lay the foundations of the great Forest Service and Forest Estate which has come into existence. Those days have long passed away and conditions are nowadays for the most part very different. But it is amazing and rather pathetic to peruse the old records and find the pioneer Forest Officer being worried owing to small inaccuracies in his accounts and the arrears into which one or more of his varied duties had fallen during a particular year, when one realises the herculean task he was grappling with—even if it is regarded from the sole viewpoint of the extraordinary tax he was called upon to make on his physical capacity alone.

Leeds was therefore on safe ground, even if his point of view could not be adequately appreciated in those days, when he gave as his reason for the failure to undertake new demarcation work during the year the paucity of his experienced staff. It will be remembered that two of his officers, Captains Seaton and Stenhouse, were on leave in Europe studying in French forests. They returned during the year; and this year was also notable by reason of the fact that Dr. Schlich joined in Burma, taking up his appointment in the Department. The want of a trained staff would, as the Secretary of State said, be corrected in future under the new regime being introduced of appointing recruits trained at home to the Department. But in a subsequent communication the Secretary of State reiterated his agreement with the opinions of the Government of India "as to the necessity of establishing reserved forests in Burma."

Leeds appears to have held curious views on the subject of

demarcating and reserving forest areas. It is probable that these opinions may have led Brandis to secure his transfer to Bengal. In any event, in his 1866-7 Report (his last for Burma) Leeds advocated the formation of teak plantations in Burma in place of the demarcation of reserves from the existing forests. He made the remarkable statement that the plantation system would "very soon entirely change the opinions held on the subject of the speediest and best mode of reproduction." It is very evident that holding these views his heart was not in the demarcation and reservation work, which had made little progress. The Chief Commissioner correctly held the opinion that both systems could go on together, as they were sufficiently distinct in their character not to influence each other in any manner. He added, "only the experience gained over a series of years will determine under which system the reproduction of teak will advance the faster."

During the year that curious malady, apparently a form of anthrax, had broken out amongst the elephants employed by the Department which had suffered heavily. Wild elephants were also dying from it; the disease is known also to attack bison and other wild game. It was decided to stop the purchase of all elephants until the disease had abated.

In connection with the plantation work being carried on Leeds gave some notes on the rate of growth of the teak tree in various parts of Burma, as then observed. The Government of India's comment was as follows: "The results show, as might be expected, a wide divergence according to the locality where the tree was grown. Thus, trees five years old in the Myodwin plantations had attained a girth of 18 inches and a height of from 33 to 40 feet; at Prome, trees nine years old had attained about the same size, and showed an average annual increase of from two to three inches in girth. On the other hand, a number of teak trees measured annually near Way village, in the Thoongay Forests, show a yearly increase of only half an inch in girth. The Conservator might be requested to collect all data which illustrate the rate of growth of the teak tree in different parts of Burma. Some attention should also be paid to the question whether the concentric rings in teak wood correspond to one year's growth, or whether sometimes two rings are formed within the same year." On the same Report the Government of India remarked on the attempts which had been made to introduce the cultivation

of cinchona into the hilly parts of Burma. The attempts had failed, but the Government expressed a hope that the "experiments will be vigorously and steadily continued, until more experience on the chances of success has been obtained. The production, at a moderate expenditure, of the bark (for quinine) in Burma, would doubtless be a great boon to the inhabitants of the country, who are reported to suffer from fever and frequently severely."

This subject was again alluded to in a Despatch (Home Department, No. 92, dated 4th July, 1868) from the Government of India to the Secretary of State. It had been decided to continue the experiment in Burma, and Captain Seaton, who had been appointed Conservator on the transfer of Leeds to Bengal, was deputed to Madras "to acquaint himself with the method of treating and cultivating the cinchona and to take charge of the cases containing the plants in their transit to Rangoon." It was also proposed to have a couple of Karen lads regularly trained under the Superintendent of the Cinchona Nurseries at Ootacamund, for service in the Forest Department of Burma. This step was taken on the advice of Brandis, who had visited the Nilgiri nurseries and wrote a letter on the subject (No. 13, dated 17th March, 1868) to the Chief Commissioner of Burma. That the introduction and cultivation of this valuable plant was of first importance in India is beyond dispute. But it is difficult to appreciate the reasons which saddled the already overburdened Forest Officers with the work, which could have been more effectively undertaken by the Superintendent of the Botanical Gardens. Doubtless, however, it was in pursuance of Brandis' tactful policy to undertake any work suggested to him by the Government of India in order to strengthen the position of the infant Department with the local administrations throughout the country.

The year 1868-9 brought to an end the systematic operations of the Department initiated in 1855-6, and an interesting review of these operations is given by the Chief Commissioner who had succeeded Sir Arthur Phayre, together with a tabular statement showing the results of the working of the twelve years. The Chief Commissioner had become strongly influenced by Leeds' ideas on the question of plantations versus reserved forests. He had strenuously opposed, without success, Leeds' transfer from Burma. He differed, however, from the latter's expressed opinion that the blasting operations in the streams

demarcating and reserving forest areas. It is probable that these opinions may have led Brandis to secure his transfer to Bengal. In any event, in his 1866-7 Report (his last for Burma) Leeds advocated the formation of teak plantations in Burma in place of the demarcation of reserves from the existing forests. He made the remarkable statement that the plantation system would "very soon entirely change the opinions held on the subject of the speediest and best mode of reproduction." It is very evident that holding these views his heart was not in the demarcation and reservation work, which had made little progress. The Chief Commissioner correctly held the opinion that both systems could go on together, as they were sufficiently distinct in their character not to influence each other in any manner. He added, "only the experience gained over a series of years will determine under which system the reproduction of teak will advance the faster."

During the year that curious malady, apparently a form of anthrax, had broken out amongst the elephants employed by the Department which had suffered heavily. Wild elephants were also dying from it; the disease is known also to attack bison and other wild game. It was decided to stop the purchase of all elephants until the disease had abated.

In connection with the plantation work being carried on Leeds gave some notes on the rate of growth of the teak tree in various parts of Burma, as then observed. The Government of India's comment was as follows: "The results show, as might be expected, a wide divergence according to the locality where the tree was grown. Thus, trees five years old in the Myodwin plantations had attained a girth of 18 inches and a height of from 33 to 40 feet; at Prome, trees nine years old had attained about the same size, and showed an average annual increase of from two to three inches in girth. On the other hand, a number of teak trees measured annually near Way village, in the Thoongay Forests, show a yearly increase of only half an inch in girth. The Conservator might be requested to collect all data which illustrate the rate of growth of the teak tree in different parts of Burma. Some attention should also be paid to the question whether the concentric rings in teak wood correspond to one year's growth, or whether sometimes two rings are formed within the same year." On the same Report the Government of India remarked on the attempts which had been made to introduce the cultivation

It is not possible to give with much accuracy the probable cost of rearing this number of trees, though up to the present time the outlay amounts to Rs.23,067, as follows: 1864-65, Rs.2,248; 1865-66, Rs.3,203; 1866-67, Rs.7,273; 1867-68, Rs.10,343: total, Rs.23,067.

The outlay on the existing plantations will, it is hoped, diminish year by year, and within a very few years we may reasonably expect that some of the earlier plantations will return a revenue from the sale of thinnings."

On page 199 is the interesting tabular statement submitted with the Chief Commissioner's review of the 1867-8 Report.

The following note by the Chief Commissioner is a valuable record of the twelve years' work:

"The main features of it are, that 294,778 tons of timber have been extracted from the forests *within British territory* that this timber has realised a gross revenue of £542,705, and that the outlay incurred on its extraction, including the general supervision of all the forests of British Burma alone, amounts to £306,494, leaving a clear balance of £236,211, the whole of which has flowed into the State coffers as absolute gain to the Imperial Revenue. These figures are arrived at irrespective of the large revenue derived from foreign-grown timber which will be referred to further on. The value of the timber is stated to be £1,222,650. To obtain this return the State has sunk no capital, whilst the purchase of the small stock, plant and elephants, together with a small sum for the clearance of hill streams, have been met from the current revenues. The operations undertaken to replace this vast quantity of timber are so minute and insignificant, that up to the present time it may almost be said no attention whatever has been paid to a systematic course of reproduction. Bearing in mind the high net revenue realised from the *home-grown* timber during the past twelve years, realised without any risk whatsoever, I have no hesitation in declaring that the time has arrived for a liberal outlay on the Department generally, whether as regards the prosecution of plantations on a large scale, the improvement of some of the larger streams down which the timber is rafted, or the improvement in pay and position of the officers of the Department. On the former point, distinct propositions will, as intimated in the eighth para. of this letter, be submitted, and as regards the latter, the opinion of the chief engineer, Colonel Fraser, will be solicited

PROGRESS OF FOREST CONSERVANCY

199

ENCLOSURES IN NO. 198 STATEMENT EXHIBITING RESULTS OF FOREST OPERATIONS IN BRITISH BURMAH FOR TWELVE YEARS, VIZ. FROM 1856-7 TO 1867-8

Years.	British Timber.			Foreign Timber.	Grand Total of Operation.	Receipts.				Establishment and Working Charges.			
	Govt. Agency.	Permit Agency.	Total.			Govt. Agency.	Permit Dues.	Duty on Foreign Timber.	Miscellaneous Receipts.	Total.	Govt. Agency.	Permit Agency.	Foreign Timber Agency.
856-57	Tons. 19,066	Tons. —	Tons. 19,066	Tons. 73,400	Tons. 92,466	Tons. 2,31,480	Rs. —	Rs. 2,52,698	R s. 274	Rs. 5,34,452	Rs. 1,56,359	Rs. —	Rs. 7,500
857-58	12,732	—	12,732	49,133	61,865	1,61,183	—	1,75,399	2,776	3,39,358	2,55,113	—	7,500
858-59	20,462	—	20,462	44,948	65,410	7,71,646	70,880	1,83,040	4,889	10,30,455	1,99,039	61,372	7,500
859-60	9,977	3,911	13,888	49,287	63,175	3,39,796	44,090	1,94,256	5,058	5,83,200	1,73,638	24,748	7,500
860-61	6,790	9,079	15,869	61,704	77,573	4,31,841	93,657	2,30,726	13,369	7,89,620	2,71,754	17,724	7,500
861-62	14,013	8,024	22,037	76,759	98,796	2,88,602	1,17,914	3,02,484	10,369	6,99,369	2,61,623	61,711	7,500
862-63	16,369	35,899	52,268	68,078	1,03,977	1,80,141	1,64,794	2,30,827	7,552	5,84,314	2,59,683	50,447	7,500
863-64	10,297	22,655	32,952	75,681	1,08,633	2,91,482	2,44,621	2,17,071	11,545	7,65,619	1,54,485	59,617	11,598
864-65	6,472	12,829	19,301	82,849	1,02,150	3,72,521	2,35,357	2,83,207	45,447	9,36,232	1,53,828	58,626	50,786
865-66	14,262	23,657	37,919	1,01,448	1,39,367	3,98,481	2,24,462	2,47,618	28,068	8,98,629	2,14,647	61,217	36,203
866-67	9,793	23,756	31,549	55,867	87,416	1,64,085	1,09,362	1,25,555	25,051	4,24,053	1,95,907	60,179	29,050
867-68	8,646	24,458	33,104	73,793	1,06,897	2,35,435	2,04,219	1,85,725	22,182	6,47,591	2,40,699	63,760	23,928
Total	148,879	145,899	294,778	812,917	1,67,695	39,16,693	15,10,356	26,29,536	1,76,307	82,32,893	25,46,745	5,18,201	2,04,065

British Timber—Government—Agency	Tons	148,879	average market value 45 rupees per ton = Rs.	66,99,555
Permit	"	"	"	65,65,455
Foreign Timber	"	"	"	365,81,265
Grand Total	"	"	Value	= Rs. 4,98,46,275

Compiled from Statements submitted by the Conservator of Forests, with Letter No. 994, dated 18th January, 1869.
 " " " " " Officer in Charge Kadoe Revenue Station, with his Letter No. 699, dated 24th January, 1869.
 " " " " " Inland Customs Office at Theyetmyo, with his No. 136, dated 25th January, 1869.
 " " " " " Tongoo, with his No. 10, dated 28th January, 1869.

British Burmah
Public Works Department
Rangoon, 24 March, 1869.

on his return from his tour of inspection. Since I commenced this review, the intentions of the Government of India, relative to the third point, have been communicated to me, so that I need say nothing more on this subject. I will only remark that I hold it the bounden duty of the Imperial Government to repay the Province some portion of the large revenues which have been derived from this Department.

In addition to the revenue derived from the home-grown timber should be considered the revenue derived from timber brought down from Burma proper, and the dependent States. For the twelve years, commencing with 1856-7, it amounted to £262,953. Deducting from this sum £20,406, being the working expenses, a balance of £242,547 remains, which represents the actual gain to the State. If this sum be added to the profit arising from the sale of home-grown timber and to the miscellaneous receipts, amounting to £17,630, the result is £496,388, or very nearly half a million sterling. It should be steadily borne in mind that this sum has been realised without any risk, and without the agency of any capital.

Reviewing the foregoing in the briefest manner, it may be said that 1,107,695 tons of timber to the value of £4,984,627 have, within twelve years, passed through the hands of the Department and the Frontier Custom Houses, realising to the State a clear revenue of £496,388. These figures, it is true, embrace details of operations which were not connected with the Forest Department proper, but as the bulk of them refer to that Department, I may point to them as indicative of the success which has resulted from the system laid down by Dr. Brandis in 1855-6 for the conservation and working of the forests in British Burma, and I here desire to record my high appreciation of that officer's most valuable services, fraught as they have been with such high results."

The staff of officers in the Department at the period were Captain Seaton, Conservator; W. C. Graham, Deputy Conservator; Lieutenant Stenhouse, Dr. Schlich, M. J. Slyn, F. A. Elsner, Assistant Conservators; and A. M. Buchanan, Personal Assistant to the Conservator.

The Government of India sanctioned the plantation work with the proviso that the areas selected should be suitable, that each block selected for such operations should have a responsible resident officer in charge who was to be engaged solely on this work, and that a regular plan of operations should

be prepared and submitted for the previous sanction of the Government. They added: "But while special officers will thus be engaged in the formation of new forests by planting, the care of the natural forests should not be neglected." They also drew attention to remarks in Seaton's Report which gave evidence that, in spite of the prohibition in the forest rules, "toungya" cultivation was still practised in teak localities. The remedy for this was, said the Government of India, to concentrate the work, "select the more valuable teak localities and demarcate them as State Forests, and gradually abandon the care of the remainder." This order is reiterated several times in the course of the Government of India's review of the Report.

The two Annual Forest Reports for 1868-9 and 1869-70, written by Seaton which, owing to delays, were reviewed by the Government of India together, are by far the most advanced and detailed type of Forest Reports which had yet appeared in India. They are monuments both to the industry of the writer and to the remarkable progress which the Burma Forest Department was so rapidly making. Seaton had the benefit of the few months he had spent in making acquaintance with scientific forestry management in France, and had also in Schlich a fully trained Forest Officer as one of his Assistants. And the Reports give full evidence of the advantages which this combination gave rise to. They are far too lengthy to be dealt with in any detail here. A brief review of the main characteristics will be attempted in order that the position to which Burma had attained towards the end of the period under review may be appreciated.

The two principal measures adverted to in these Reports, which were designed and adopted in order to secure for the future a permanent and sufficient supply of teak timber from the forests, were the demarcation of the more valuable forest tracts and their complete protection, and the establishment of plantations on a large scale.

During the period Dr. Schlich had also made an inspection of and submitted a Report on the pyingado (*Xylia dolabriformis*) forests of Arakan.

It will be remembered that "the teak forests throughout the Province, with the exception of the Thoungyeen, Attaran, Salween and Western Forests, have been subjected to a regular system of conservancy since 1856. Under the working plan then inaugurated the teak-producing tracts of the

Province were divided into six main divisions, in each of which one-fourth of the available first-class trees, 6 feet in girth and above, were to be girdled or killed annually under the direct supervision of the Forest Department, it being estimated that a rotation of twenty-four years sufficed to allow of second-class trees, 4 feet 6 inches girth, to attain first-class size.

In the Thoungyeen District this system of girdling, believed to be the keystone of conservancy, was eventually introduced in 1865."

The six divisions above alluded to were styled the Rangoon Division (including eight separate forest districts as they were termed), Tharrawaddy (ten forest districts) and Eastern Prome (seven forest districts). The fourth, the Western Prome Forests, comprised the areas situated to the west of the Irrawaddy on hills along the base of the Arakan Yoma Range. These forests were extensive, but were of inferior size to the eastern tracts. They were of a very dry description, were exposed to annual conflagrations and to "ya" (i.e. shifting) cultivation which, it was said, threatened their entire extermination in a few years. Under orders issued by Government in September, 1861, they had been actively worked since 1862 under a system of long permits subject to the payment of a fixed annual minimum revenue, and with permission to girdle all trees 5 feet in girth and above. Up to 1869 they had yielded 44,620 logs, chiefly undersized timber, owing to the very large proportion of timber obtained by the permit-holders from trees killed in "toungya" or "ya" clearings. The remaining two divisions were the Sittang (sixteen forest districts) and the Salween (ten forest districts).

Extensive valuation surveys of the contents of the various forests in these divisions were being carried out at this period with the object of ascertaining as correctly as possible with the small staff then available for this work the number of teak trees of the various classes they contained. As an instance of the nature of the work thus being undertaken, and the information being obtained on the subject of the growth of teak in different parts of the Province, and of the best sites for forming plantations, the following may be given :

"Regarding the growth of teak in the Tharrawaddy the following information has been collected regarding the rate of



A TYPICAL VIEW OF THE BAMBOO FOREST, BURMA

Photograph by H. Jackson

growth, by counting the annual rings on the butt-ends of logs felled in the following districts :

	No. of Trees.	Girth.	Rings.	Mean Age at 6-feet girth or first-class size.
		ft. in.		
District.—Tapoon, Toungnyo District. Forest, in the plains . . .	1	8 8	93	} 55 years.
Soil.—Sandy alluvial loam . . .	2	5 1	34	
District.—Fadingben . . .	1	8 6	234	} 153 years.
Forest on low hills . . .	2	7 10	240	
Soil.—Hard stiff loam, sandstone close to surface . . .	3	8 0	224	
	4	9 10	178	
Underwood.—"Minwa" Bamboo . . .	5	8 0	196	} 94 years.
Bwet choung, Shoalay . . .	1	7 10	96	
Forest, on low hills . . .	2	7 0	98	
Soil.—Light sandy loam . . .	3	7 6	112	
detritus of sandstone . . .	4	8 0	196	} 127 years.
Undergrowth.—Bamboo of Kya-thoung . . .	5	6 6	102	
and Theik varieties . . .	6	8 6	111	
Padetmyoung, Shoalay . . .	1	7 4	145	
Forests on low hills . . .	2	7 2	89	} 127 years.
Soil.—Light loam . . .	3	6 6	170	
Undergrowth.—Bamboo of Min and Kyathoung varieties . . .	4	7 8	202	
	5	8 0	178	

Instance of very rapid Growth in the Plains.—Near Nyoung-bengtha, about four miles south-east of Pougdeh, an area of about one-fourth of an acre in extent planted with teak by an elephant trapper in 1858, has been examined by Lieutenant Stenhouse, who reports the girth of the largest tree to be 3 feet 7 inches, and height 50 feet; and the mean of the measurements of twenty-five trees (all taken at 6 feet from the ground) to be 2 feet 11 inches. The number of rings, viz. eleven, coincided with the age of this plantation. The uniform height of the trees appeared to be 50 feet.

The locality is close to the original bed of the Toungnyo Stream, which silted up thirty years ago, and left high alluvial ground on the south bank well raised above the influence of inundation. It will now be examined with a view to ascertaining the area available for teak plantations."

As has been already shown, the Government of India had on several occasions insisted on the urgency of carrying out the work of demarcating the best existing teak forests and creating them reserves. To this work the Officiating Chief Commissioner, although with obvious reluctance, owing to the

opinions he appears to have assimilated from Leeds, as the correspondence sufficiently illustrates, had at length put his hand. In a Resolution (No. 164-31F., dated 10th May, 1870) the following summary of the tracts proposed for demarcation in Pegu were given :—

Toungoo District :	Acres.	Myanoung District—contd.	Acres.
1. Pyoon-Choung . . .	3,519	10. Lower Payagee . . .	572
Total . . .	3,519	11. Upper " . . .	1,041
Prome District :		12. Lower Tapan . . .	675
2. Bwet-Choung . . .	2,887	13. Upper " . . .	1,015
3. Upper Padinben . . .	560	14. Toung-nyo Hill . . .	3,520
4. Lower " . . .	241	15. Nyan-Lay . . .	5,840
5. Shaboung . . .	2,229	16. Pazinjay . . .	1,280
Total . . .	5,917	17. Kannee . . .	768
		Total . . .	31,452
Myanoung (Tharawaddy)		Prome District :	
District :		18. Oo-pau-lan-gyee . . .	1,362
6. Kangyee . . .	13,277	19. Oo-pau-lan-galay . . .	515
7. Choungwah . . .	744	20. Yeytha . . .	403
8. Gway-douk-tsan . . .	1,306	Total . . .	2,280
9. Thit-Cho . . .	1,414		

The total area being 43,168 acres, or 67 45 square miles."

Sanction was given to the final demarcation of the whole of these areas, with the exception of Nos. 1, 6 and 10, on which further enquiry was deemed necessary. In according this sanction the officiating Chief Commissioner requested that as far as possible the inhabitants of the adjacent villages might be permitted the fair use of the tracts for grazing purposes, and that they might also be allowed to cut firewood or wood necessary for their dwellings. Separate maps of the reserves on a scale of 2 inches to the mile were to be prepared and numbered according to the dates of demarcation.

In their letter, No. 619F., dated 13th October, 1870, on this subject, the Government of India expressed their satisfaction with this "small beginning" and trusted that this important work would be steadily carried on until a sufficient area of the more valuable forests in all districts had been demarcated and effectually protected against injury and encroachment. The letter continued :

"It will not, in the opinion of the Governor-General in Council, be necessary to fix any limit of the aggregate area of reserves to be demarcated, for it is apparent from the papers

submitted that even in Burma it will not be easy to secure the occupancy of large areas of forest land in accessible positions. The timber made available for local consumption and for the market from forests within British territory, as well as from beyond the frontier, has, during the last three years, been close upon 150,000 tons annually, and in the orders passed on the subject of the plantations in Burma it has lately been stated that, if these plantations are extended to an area of 30,000 acres, this area is not likely to yield more than 24,000 tons of timber annually. Should, eventually, the supply of timber from the forests beyond the frontier fail, much inconvenience will be felt, unless care has been taken considerably to increase the productive resources of the forests within British territory; and with this contingency in view, it seems right to protect and improve the natural resources of the forests in addition to forming new forests by planting."

Opposition was being experienced from some of the Civil Officers to the demarcation of the reserves on the score that the land would be far more useful for cultivation, and that in such a thinly populated country as Pegu it was far more important to extend cultivation than to reserve teak trees, and that the latter policy required, therefore, the most earnest consideration. The Government of India wrote :

"The Governor-General in Council is satisfied that in most cases it ought not to be difficult in Burma to combine the increase of population with the protection of the more valuable forest tracts. Extension of cultivation should certainly be encouraged, but, according to all accounts, vast extents of land not covered with teak, or not producing valuable forests, are available for this purpose in most districts. Existing rights and interests must, as a matter of course, be scrupulously respected; but where really valuable forests are at the disposal of Government, it is right to reserve them for the public benefit."

On the subject of granting permission to the occupants of villages adjacent to cut and remove produce free, the Government of India pointed out that, with the increase of population, such rights might prove serious hindrances to the conservancy of the reserves, and that the latter should therefore be, so far as possible and without infringing on existing

rights, free of all privileges and prescriptive rights. They also vetoed the suggestion that small villages and hamlets in existence within certain proposed reserves should be allowed to remain there, maintaining that it would be preferable to compensate the occupants and remove the villages to the outside.

On the subject of the formation of plantations an extensive correspondence of the period is extant, parts of which have been alluded to. The Government of India (Letter No. 632F., dated 20th October, 1870) summarised the position of the plantation work at the end of the period here dealt with. After giving a brief history of the planting operations undertaken in Burma during the earlier years of forest management in that Province, work which was initiated with the object of experimentally determining the best and most economical mode of procedure in raising teak artificially, the Government of India acknowledge that it was to Leeds that the credit belonged of having commenced planting work on a large scale. The letter then continued :

“ In a work of this description it is evidently necessary to frame a general plan of what is intended to be accomplished. It has been noticed that the Conservator proposes, for the present, to work up to an aggregate area of 30,000 acres, and that the Inspector-General of Forests, in paras. 14 to 17 of the first sections of the revised plan of forest operations in Burma, estimates the probable yield of these plantations, when arrived at maturity, at 40 cubic feet per acre per annum. If this estimate is realised, then an area of 30,000 acres would secure an annual out-turn of 1,200,000 cubic feet, or 24,000 tons of timber. It cannot, of course, be foreseen to what extent it may ultimately be found advisable to carry on these operations ; but so much is evident, that this area is not too large, considering that during the last three years the yield of timber in British territory has varied from 33,000 to 52,200 tons, and that the importation from beyond the frontier has been upwards of 100,000 tons annually. Should either of these sources fail, or their out-turn be diminished considerably, the yield of 30,000 acres of teak plantations would only furnish a small portion of the requirements of the trade. It may, therefore, be considered as the first aim to work up to this area, and the first step should be to secure the land required for this purpose. Captain Seaton reports that he has already selected

PROGRESS OF FOREST CONSERVANCY 207

and demarcated in a preliminary manner the following blocks, aggregating 12,679 acres :—

RANGOON DIVISION	
Kyek-pyoo-gan, 1,753 acres, of this area,	Acres.
available for planting teak	1,100

THARAWADDY DIVISION	
Thayet-Choungwah	742
Kadin Beeling	6,880

SITTANG DIVISION	
Kannee	437
Pyoon-Choung	3,520

Total	Acres 12,679
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From the communications received on the subject of demarcation of forest tracts, it has been noticed that the final demarcation of two of these blocks, the Choungwah and Kadin Beeling, both in the Tharawaddy District, has already been sanctioned.

Wherever it may be decided to establish these plantations, so much is beyond all doubt, that the operations should be concentrated on a small number of large blocks, and that no time shall be lost in selecting and demarcating the needful land for this purpose ; for even in Burma the difficulty of securing for Government the occupancy of suitable land for such purposes will doubtless become greater every year. In para. 19 of Colonel Fraser's letter it is recommended that if good localities can be found close to the port of Rangoon for plantations, they should be taken up to the fullest extent, and the plantations now in existence on the Irrawaddy and Sittang should simply be maintained without increasing their size."

After dealing with the necessity of choosing proper soils, situations and aspects in localities from which the material could be satisfactorily extracted when it had reached maturity, the Government of India proceeded :

" It cannot be expected that in all blocks which may be selected all circumstances will be equally favourable ; and it may occasionally be advisable to select localities on account of their excellence in regard to special points. It seems a

matter for consideration whether the facility of procuring labour near Toungoo does not justify the carrying on of the work in the Sittang plantations; and whether, considering the excellence of the soil in the Tharrawady blocks, the work should altogether be abandoned in that division. At all events, it seems right to secure the occupancy of the blocks selected for that purpose in the different divisions.

Meanwhile every effort should be made to select and demarcate the needful extent of land to make up 30,000 acres in the vicinity of Rangoon, provided blocks of suitable size and of good soil can be found, and a Report should be submitted concerning the blocks thus selected.

As regards the limit of the annual operations, it is understood that you consider an extension of 800 acres might be planted at an annual average cost, including maintenance of the earlier plantations, of Rs.30,000, which is the amount already sanctioned for the current and next year.

An examination of the tabular statement appended to your Report seems, however, to show that, if an uniform extension annually is contemplated, the cost of planting 400 and 800 acres, respectively, with the maintenance of previous plantations, will stand as follows:

Total yearly outlay for extension and maintenance of—

	400 Acres. Rs.	800 Acres. Rs.
1st year . . .	11,860	23,720
2nd „ . . .	13,860	27,720
3rd „ . . .	17,060	34,120
4th „ . . .	19,060	38,120
5th „ . . .	22,260	44,520
6th „ . . .	24,120 ¹	48,240
7th „ . . .	24,120 ¹	48 240

and so on, the same amount annually.

The planting of 800 acres annually would thus entail a much larger outlay eventually than is at present contemplated. It seems, however, quite uncertain whether the estimates upon which the statement appended to your Report is based are likely to be borne out by actual experience. The great

¹ To the figures entered in the statement for these years must be added the cost of extension as follows:

6th year, Rs.12,260 + 11,860 = 24,120

7th „ „ 10,260 + 13,860 = 24,120

difference in the cost of the work at different localities, and the uncertainty in the supply of labour, seem to render all estimates extremely uncertain. Under these circumstances, the best plan will be not to fix the area to be planted annually, but to limit the annual outlay. For the current and next year this amount has already been fixed at Rs.30,000, and a similar sum will, if possible, be granted every year. Against this grant should be charged all outlay on account of maintenance extension, and such establishments as are not included in the sanctioned scale, and as are not charged to (B.) 'Establishment.' "

In alluding to the supervision of this work the Government of India reiterated their desire, as expressed in the orders in the 1867-8 Report, that each block or group of blocks should be placed in charge of a responsible officer, who should as far as practicable reside on the spot and have no other duties.

In January, 1870, the establishment of Forest Rangers in Burma had been increased, and it was hoped that this increase would enable these orders, which the Government of India considered to be indispensable if the work was to meet with success, to be given effect to. If any additional subordinate establishment was required for the work it might be entertained as a temporary measure, the cost being charged under the head of "Plantations."

The idea that a modified system of "toungya" cultivation could be made use of in advancing the plantation work was due to Brandis. It was not new. In some famous French and other continental forests the system had been practised many years before. The procedure contemplated the raising of an arable crop for a year or two on the area from which the trees had been felled, and then in the third year the seed of the crop and that of the teak was sown together. The two crops germinated and grew up together. On ripening the former would be cut and removed, leaving a plantation of teak seedlings on the area. The method had already been commenced in Burma, though in this instance teak seedlings had been planted out instead of the seed being sown. In a letter (No. 174-5c., dated 8th September, 1870), Seaton alludes to the work as follows :

" Having recently visited the Kyek-pyoo-gan teak plantation and examined the country lying immediately to the north-west of it, I have now the honour to submit, for the information of

the Chief Commissioner, a brief Report on the present condition of the plantation, and certain proposals for extending the area already made over to this Department for plantation and other purposes.

On the occasion of my visit, almost the entire area (47·25 acres) cleared for this season's operations had been planted out with teak seedlings, at 6 feet by 6 feet distances by the Shan, Burmese and Karen cultivators, and by hired labour on the area under direct Government management. In the latter, preparations had been made for putting out sweet potatoes by mounding the spaces between the teak plants. In places also both cotton and chillies were coming up with a strong, healthy look.

The sweet potato is also being cultivated very extensively on the Shan, Burmese and Karen lots, a strong proof as to its remunerativeness. It, in fact, imparts to the plantations the appearance of a market-garden in England, the ground being well turned up, worked into regular mounds, and kept quite clear of weeds. At the lowest computation, each acre thus cultivated will yield Rs.80 to Rs.90 worth of sweet potatoes (for which there is a great demand at Rangoon), and cover the entire cost of such cultivation, as well as of the teak planted on it. If there should be anything of an ordinarily good crop, a clear surplus will accrue as revenue to the Department after deducting all direct cultivation charges.

This is the first time an attempt at a more elaborate system of cultivation has been attempted in conjunction with teak than that of sesamum and cotton, which have been tried now two or three seasons with varying success. It may be that further experience is needed to establish the superiority of this new system; but, under any circumstances, the experiment, it must be admitted, promises very satisfactory results, and as such is deserving of attention.

A part of last year's plantation has also been planted with sweet potato, making in all 50 acres thus cultivated. In addition to this work, 30,000 pine-apple tops are being set out along the outer edge of the plantations of 1868 and 1869, so as to have a belt of undergrowth impenetrable to the jungle fires on every side. A small coffee nursery has also been successfully formed, and seedlings will be put out in the older plantations next year. As it thrives well at Rangoon under partial shade, coffee may be expected to return something of a yield at Kyek-pyoo-gan.

The object of these experiments is obvious. If over a limited area in each block of teak plantations a small amount of revenue can be obtained yearly by sale of fruits and other produce, the Department will be entirely relieved from the expenditure involved in watching, protecting and thinning the older plantations."

Seaton was so well satisfied with the development of the young plantations in this locality that he applied for permission to take up considerable extensions of land for the purpose of increasing the plantation area. These proposals were under consideration and had the warm support of the Government of India.

In 1863 the Government of India had suggested that it might be advisable to introduce Forest Conservancy into the Aracan Forests, in the event of there being a steady demand for "pyinkado" (ironwood) timber. The suggestion had not been taken up. A question had arisen anent the working of the amended rules of 1865, and the Chief Commissioner (General Fytche) was led to think that a detailed examination of the Aracan forests would show what modifications of the rules were necessary and whether it would be advisable to place the administration of the forests under the Forest Department, and so relieve the Civil Officers of the duty. Dr. Schlich was nominated by the Conservator to undertake this piece of work, and the excellent Report, dated September, 1869, he drew up upon these forests was the outcome of his visit, and remained in effect the only one (written by a Forest Officer) on the subject of these forests for the next thirty years.

The Report established the following facts :

(1) The quantity of pyinkado timber of all sizes in the forests was very great.

(2) The rate of consumption of this timber at the time was very low when compared with the yield it was estimated the forests could produce.

(3) The character of the timber generally was held to be against the probability of any large trade being done in it. Beyond local requirements there was no demand for it, and what export trade existed had entirely died out.

In the face of this opinion the Chief Commissioner considered that any system of conservancy involving a large outlay was greatly to be deprecated. He was also of opinion that it would be unnecessary at that juncture to place these forests under the

control of the Forest Department. They would therefore remain under the supervision of the Civil Authorities. The Chief Commissioner's views on the subject were in accordance with those which had been expressed by the Commissioner of Aracan.

The Chief Commissioner's Report continued as follows :

" But the Chief Commissioner would desire to improve the present system of working these forests, and he believes this can be done without increasing the fees at present levied on the cutting of trees. Dr. Schlich reports that the main causes of injury lie in the *toungya* cultivation, and the wasteful manner in which the woodcutters fell and burn the trees. Both of these causes of injury can be materially diminished, if not entirely got rid of, and General Fytche will accordingly record his view on the subject of the preservation of the forests from wilful injury.

The most valuable and extensive forests lie principally in the district of Sandoway, and it is in these forests that, as a tentative measure, conservancy should be attempted. The main objects are :

1st. The restriction of *toungya* cultivation to tracts which should be approved by the Deputy Commissioner of the district.

2nd. The appointment of an Inspector or Ranger of Forests to be placed under the control of the Deputy Commissioner. This subordinate's duties would be confined to supervision of the forests, especially during the felling season, and to granting, under the orders of the Deputy Commissioner, licenses for cutting trees. He would report all cases of illegal cutting to the Deputy Commissioner, who could settle them according to law.

3rd. The fees received on account of cutting trees would be collected by the subordinate Revenue collectors, who would be paid a commission of 10 per cent on the collections.

4th. A revision of the amended rules of 1865 to meet the arrangements now ordered.

It will be remarked that the employment of a Forest Ranger is only considered necessary at present for the Sandoway District. After some experience has been gained of the use of this subordinate, a similar appointment might be ordered for the Deputy Commissionership of Ramree. It is doubtful whether the Akyab District will ever require one.

PROGRESS OF FOREST CONSERVANCY 213

To carry out the above arrangements, the Government of India will be asked to make over a portion of the yearly revenues accruing from these forests for the purpose of defraying the cost of the Ranger and the small staff needful to accompany him into the jungles.

General Fytche directs that a copy of these remarks be communicated to the Commissioner of Arakan for report on the following points :

- 1st. Restriction of toungya cultivation.
- 2nd. The amount of pay and allowances he would propose for the Inspector or Ranger.
- 3rd. The modification he would suggest in the amended rules of 1865."

And, so far as the Forest Department was concerned, here the matter remained for the next thirty years and more.

This review of the forests of British Burma for the period may be concluded with the following financial statement in pounds sterling for the two years 1868-9 and 1869-70.

" The financial results of the two years are very satisfactory :

	1868-69	1869-70
	£	£
Receipts	81,791	98,487
Expenditure	42,313	41,961
	<hr/>	<hr/>
	39,478	56,526
Increase in value of stock	15,602	
Outstandings	7,894	
	<hr/>	
Net profit for 1868-9	£62,974	
Decrease in value of stock	5,572
		<hr/>
Net profit, 1869-70		£50,954

The cash sum realised as surplus over the Budget Estimate in the latter year was £21,026.

	£
The total amount of net revenue for the two years is	96,004
To which must be added the value of stock in hand and of outstanding claims	46,909
	<hr/>
Making a total profit on the two years of	£142,913"

It is of interest to note that Schlich had already been promoted Deputy Conservator in 1869, the Forest Officer list, excluding the Conservator, Seaton, reading on 1st August, 1870, as follows :

“Deputy Conservators, Graham, Schlich and Slym ; Assistant Conservators, Elsmere, Buchanan and Macpherson. Stenhouse was transferred in 1869 to officiate as Conservator of Forests in Bengal in place of Leeds on furlough.”

CHAPTER VI

THE PROGRESS OF FOREST CONSERVANCY IN THE CENTRAL PROVINCES, 1865-1870

THE commencement of the organisation of a Forest Department in the Central Provinces and the work upon which the staff was engaged have been already detailed in Volume I, Chapter XXI. Captain Pearson and his Assistants had commenced the exploration and examination of the extensive forest tracts, whilst at the same time devoting some of their time to collecting for sale such of the logs lying in the forests, the aftermath of the reckless fellings made after the Mutiny, as were likely to prove saleable. As Pearson said, the sale of some of these logs formed the revenue of their first modest forest Budget. The years devoted to this work of exploration were arduous years, and Pearson was fortunate in having secured the services, as one of his Assistants, of Lieutenant (later Captain) James Forsyth of the Bengal Staff Corps, one of the most brilliant and versatile young officers of that day. Possessed of high powers of observation, a cultivated mind, and literary gifts unusual for a junior military officer of the period, Captain Forsyth carried out without sparing himself work of the greatest value to the Department during the next five years, at the end of which period he was transferred as Settlement Officer and Deputy Commissioner of Nimar, the transfer giving proof of the high opinion which had been formed of his capabilities. But his health was shattered by the arduous years spent in forest exploration work, and three years later he went home on furlough only to die at the early age of thirty-three. His loss must have proved a severe one to the Province. He left behind a lasting memorial in his book, *The Highlands of Central India*, which, in addition to being a sporting classic, is an invaluable record of the early days of forest work and life in the Central Provinces. Captain Forsyth

died whilst his book was still in the press, and thus never witnessed the success and popularity it achieved.

Whilst the forest staff were engaged upon the work of exploring the forests, a settlement branch was enquiring into the ownership of the land throughout the provinces. As has been already stated, owing to the internecine warfare which had proceeded for so long our advent into the provinces, much land had gone out of cultivation ; for no one dared to lay claim to the ownership of land, since this assumption led to robbery and extortion from the owner by the chief robber who happened to be paramount for the time being in the district. Our orderly rule changed this aspect of affairs, and aspirants to the ownership of the land appeared on all sides.

To settle these matters and to prevent the culturable wastes being seized by immigrant settlers, the Government appointed special officers to undertake settlement work under a branch termed "The Settlement of the Land Revenue." The result of the elaborate and laborious enquiries undertaken, for every village and hamlet had to be visited and every acre of land appraised and assessed, was that where any title to a property had been established, the freehold, bearing liability to the fixed Government rent-charge, was bestowed on the claimant, while all land to which no such claim could be established was declared the unhampered property of the State. Most of the hill chiefs were admitted to the full ownership of the whole of their enormous wastes, though certain restrictions as to the destruction of the forests were imposed on them. The area which remained to the State in the highlands after the settlement was only 14,500 square miles, of which 9500 was considered to be culturable, and the rest barren waste. A portion of this area was reserved as State Forest, but in every district much good land remained available for sale or lease, under definite rules which were enacted.

The total population of this region at that time was about four and one-third millions; of these three and one-third millions were Aryans and one million only belonged to the aboriginal races. These latter comprised Gonds (826,484), who gave the name of Gondwana to the country and have close affinities with the Tamil-speaking Dravidians of Southern India, and are thus exceptional to the other aborigines of these hills who have no such connection. The Kols (37,000), who occupy the north-east of the region and stretch into Chota Nagpur ; the Kurs or Korkus (44,000) ; Bygas (18,000) ; Bhils in the west

(20,000) ; and another 25,000 aborigines who had no cohesive language or territory of their own.

Forsyth gives some most interesting information on the forests and tree distribution at the period, a summary of which will enable a clear picture to be formed of the problems before the newly organised Forest Department.

From a botanical and zoological point of view this region is of high interest, as it forms the meeting-ground of some forms of vegetable and animal life which appear to be characteristic of north-eastern and south-western India. The chief forest tree of Upper India is the sâl (*Shorea robusta*), a tree addicted to occupying gregariously the tracts it flourishes in to the exclusion of other species. It forms great forests in the plains along the base of and in the lower foot-hills of the Himalaya, and also covers the greater portions of the hilly region to the south of the Gangetic valley. From the latter tract it stretches along the tableland of Chota Nagpur and thence extends into the Central Provinces in two great branches, separated by the open, cleared plain of Chattisgarh. The southern branch reaches as far as the Godaveri River, and the northern embraces the eastern half of the Satpura highlands, both branches ceasing almost exactly at the eightieth parallel of east longitude. To the west of this is the teak, which is absent from Northern India and Bengal and found but scantily in the Central Provinces to the east of eighty degrees longitude. Its method of growth, as has been already shown for Madras and Burma, is dissimilar to that of the sâl, the teak growing in scattered clumps or individuals intermixed with numerous other species.

Forsyth attempts a better explanation for the "peculiar disposition of these two timber trees" than any which had yet appeared, ascribing it to their habit of growth and relation to various soils.

"The sâl," says Forsyth, "is a tree possessed of a remarkable power of propagating itself, shedding an enormous number of seeds, at a season (the commencement of the rains) when the usual jungle fires have ceased, and which sprout almost immediately on their reaching the ground. On the other hand, the teak seeds after the rainy season, and the seeds themselves are covered by a hard shell which must be decomposed by long exposure to moisture and heat before they will germinate. This necessitates their exposure throughout

one hot season, when the whole of the grass covering the ground below is burnt in the annual conflagrations. Thus a large percentage of the seeds of the teak never germinate at all. It is clear, then, that if these two species were growing together, on soil equally suitable for both, the sâl must possess an immense advantage in the 'struggle for life' over the teak. And if to this natural advantage be added an adventitious one, in the fact that the teak is much more generally useful to man—particularly to man in a primitive state—as is really the case, there seems to be a sufficient reason why the teak should disappear before its rival in tracts where the latter has obtained a footing and is equally suitable to the soil and climate. Now an examination of the tracts on which these trees are found in Central India shows that, while the teak does not appear to shun any particular geological formation, it thrives best on the trap soils which predominate in the south and west of the Province. But the sâl, on the other hand, clearly shuns the trap formation altogether. Not only is it unknown within the great trappean area to the west of the eightieth degree of longitude, but even to the east of that line, in its own peculiar region, it does not grow where isolated areas of the trap rocks are found. Further, I believe that in no part of India where this tree grows is there any of the trap formation. With the exception only of this volcanic rock the sâl appears to thrive on any other formation, being equally abundant within its own area, where primitive rocks, or sandstones, or lateritic beds predominate. Thus I believe that the sâl, where the soil is suitable, that is where there are no trap rocks, has exterminated the teak, of which it is a natural rival. In other parts of India, where the teak does not meet with this rival, as in Malabar and Burma, it flourishes on the soils from which it is here excluded by the sâl. The general conclusion appears irresistible, but sharp contrasts perhaps best illustrate such peculiarities. Many such might be mentioned, but two in particular are very noticeable. Within the sâl region, in the hills immediately to the east of the town of Mandlâ, there is a considerable area covered by teak, to the total exclusion of the sâl. The whole of this region is composed of a trap overflow; and all around it, as soon as the granitic and lateritic formations recommence, the sâl again entirely abolishes the teak. Again, within the area of the trap and teak, in the valley of the Dénwâ River, 150 miles west of the furthest limit of the general sâl region, is

found a solitary isolated patch of the latter, occupying but a few square miles. Here the sâl grows on a sandstone formation. It is surrounded on three sides by trap rocks, and there it entirely ceases, and is supplanted by the teak as the principal timber tree. But how to account for this small and unimportant outlier of the great sâl belt? To maintain our theory some link to connect them together should be found. I think that a hypothesis, much less extravagant than many which are introduced into such arguments, will do so. Towards the fourth side of the sâl patch in the Dénwá valley lies the great open plain of the Narbadá into which the sandstone formation extends, and passes on along with primitive rocks, and with little interruption from the trap, right up to the main body of the sâl forest at the head of the Narbadá valley. The sâl, it is true, ceases in the open Narbadá valley, but so does all forest, the country having been completely cleared and cultivated for many generations. It is not then a very violent assumption to suppose that the sâl forest at one time extended down the Narbadá valley as far as the Dénwá, and that, when the country was cleared, this little patch alone was left securely nestled under the cliffs of the Mâhádeo Range, in the secluded valley of the Dénwá, into which there was no road even until within the last few years.

These are strange facts. But it would be still more strange if a corresponding distribution of animal life could also be demonstrated. Something of the kind is really almost possible. Equally with the sâl tree several prominent members of the Central Indian fauna belong peculiarly to the north-eastern parts of India. These are the wild buffalo (*Bubalus Arni*), the twelve-tined 'swamp' deer (*Rucervus Duvaucellii*), and the red jungle-fowl (*Gallus ferrugineus*). All these are plentiful within the area of the great sâl belt, but do not occur to the west of it, *excepting in the sâl patch of the Dénwá valley*, where the two latter, though not the buffalo, again recur. In the Dénwá valley there is but a solitary herd of the swamp deer, I believe; the red jungle-fowl are not so numerous as the rival species, *G. Sonneratii*, which replaces it in the west and south of India; and it is not surprising that the wild buffalo should have disappeared when his range had been reduced, by the clearance of the intermediate forest, to the narrow limits of this small valley. So large and prominent an animal requires a much larger range than deer and birds; and there is no part of the surrounding country suitable for

his habits until we reach the sâl tracts again, though very probably the extensive black soil plains of the Narbadâ valley were so before they were cleared. In corroboration of the probability of his formerly having extended further down the valley than at present, skulls and horns have been found in the upper gravels of the Narbadâ in no way differing, except in superior size, from those of the existing species. Their greater size is not surprising, as they are not larger than the horns still occasionally met with in Assam, where also the average size is stated to be now rapidly diminishing under the attacks of sportsmen."

It is of interest to remember that this remark was written some sixty years ago. What would Forsyth have thought of the position in this respect in the twentieth century?

"Two other large representatives of the eastern and western faunas, the wild elephant and the Asiatic lion, also appear to have formerly extended far into this region. In modern times, however, the advance of cultivation and the persecutions of the hunter have driven them both almost out of the country I am describing. The former, in the time of Akbar (as is ascertained from Abdûl Fuzl's chronicles), ranged as far west as Asigarh, but is now confined to the extreme east of the Province. Sir Thomas Roe, Ambassador from James I to the Court of the Great Mogul, in the seventeenth century, speaks of the lion as being then common in the Narbadâ valley. It is now seldom heard of further east than Rajputâna, although a solitary specimen sometimes appears in their old haunts further east. A lion was killed in the Saugar District in 1851, and another a few years ago only a few miles from the Jubbulpur and Allahabad railway.¹ The hog-deer (*Axis porcinus*) I have never met with in the west of the Province, nor is it very numerous even in the east, though very common in the sâl tracts of Northern India. The black partridge (*Francolinus vulgaris*) of Northern India does not extend into these provinces at all, its place being taken by the painted partridge (*F. pictus*), a very closely allied species. The great imperial pigeon of Southern India does not, I think, cross the Narbadâ to the north, though not uncommon in the higher forests to the south of that river. Scientific research among the minor forms of animal and vegetable life (for which I have had neither the time nor the knowledge) may possibly elicit

¹ The lion in India is now only met with in the small tract known as Gir in Kathiâwar and in the wildest parts of Rajputana. E.P.S.

many confirmations of the law of distribution I have thus roughly stated from observations that have presented themselves to me as a Forester and a sportsman. This is worthy, I think, of further investigation."

Allusion has already been made to the fact (I, p. 392) that little was known on the forest resources of the Central Provinces when the Province was constituted. The areas were very large and by some were considered to contain inexhaustible forests. Others thought that the hopes built upon their resources as a source of supply of material for the railways would not be realised. But the true position of the forests was very far from being appreciated. It was only their detailed exploration which revealed the extent to which the forest areas had been exhausted of large timber. And their devastation was mainly attributable, as has been shown was the case in other parts of India, to the practice of shifting cultivation, known in Central India as "dhya." The method of procedure carried out by the aborigines in the Central Provinces was lucidly described by Forsyth and has already been detailed (I, p. 398).

Forsyth commented strongly on the absence of communications in the Province at the time. He pointed out that owing to this state of affairs the railways were importing pine sleepers from Norway and ironwood from Australia, as they proved cheaper than the carriage of sâl sleepers from the great untapped forests of this species in the Province. "There is something wrong," he wrote, "where this is the case, and that something is the want of a good road into the sâl regions from the railway at Jubbulpur, which road should have been made, for many other reasons (to open up the rich cotton soils to cultivation and export) besides this, long ago." About thirty years later the same state of affairs existed in a division in which the writer served as an Assistant, in Chota Nagpur, the Assansol-Nagpur branch of the Assam-Bengal railway being laid with iron "pot" sleepers instead of with sâl, although parts of the line passed through magnificent sâl forests. The surplus timber from these forests was subsequently cut and sent up to the United Provinces to sleeper a railway there, as will be described elsewhere.

The sâl forests of this region did not, however, escape devastation from the shifting or dhya cultivation. Thousands of square miles of sâl forest had been destroyed by the Bygas under this form of cultivation, the ground becoming afterwards

occupied by a dense scrub of low sâl bushes springing from the stumps. And, as mentioned by Forsyth, the largest trees were everywhere girdled by these aborigines to allow the gum resin of the sâl (the "dammer" of commerce) to exude. This dammer resin (called dhök in these parts) was extensively used at this period as a pitch in dockyards, and for coating commercial packages.

The common method of extraction was to cut a ring of bark out of the tree three or four feet from the ground when the gum exudes in large bubbles. Cuts made in several half circles are equally effective and do not kill the tree, as is the case with the former method. One of the first acts of the newly constituted Forest Department was to prohibit the ringing of sâl trees for the extraction of "dammer," but the practice was still continued in the vast area of sâl forests in the Native States, which were amply sufficient to supply the requirements of the trade at that time. Practically the only commercial transactions of the Bygas with the representatives of the plains merchants was the sale of dammer and lac. These representatives journeyed annually into the hills with pack-bullocks and obtained the dammer and lac in exchange for salt, beads and arrow-poison.

Fortunately Forsyth leaves us a lucid description of the position of the teak forests of this region as existing at the period.

"As regards the teak forests, the supply available for railway uses had already been much reduced from the causes mentioned. A good deal was, however, still left in the remoter forests, where communications were not so easy; and the forests, if properly taken in hand, might have yielded a steady supply of large timber for many years. But unfortunately the grave mistake was now made of announcing that *after a certain time* the forests would be brought under Government management and strictly conserved. This was the death-blow to the remainder of the teak throughout the northern parts of the tract. The railway contractors and numerous speculators, foreseeing the value that timber was likely to acquire, owing to railway operations and the closing of the forests, then went into the jungles with bags of rupees in their hands, and spread them broadcast among the wild tribes, with instructions to slay and spare not—to fell every teak tree larger than a sapling that they could find, and mark them with their peculiar mark. It was only too faithfully done;

and scarcely anything that was accessible escaped the axe. Now came delay in the railway works, failure of the contractors and want of money. The cut timber was abandoned wholesale where it lay. Teak wood is full of oil and burns readily after lying for a short time. The jungle fires occurred as usual in the long grass where the logs were lying, and the great majority of them were burnt! The exact amount of the destruction can never be known. For years afterwards, when exploring in the forests, we continued to come on the charred remains of multitudes of these slaughtered innocents, most of them being quite immature and unfit for felling at any time. All that were worth anything were saved by the Forest Department in after years, and the value even of these amounted to many lacs of rupees. They were not a hundredth part of those that were cut, which should probably be reckoned by millions rather than thousands. The injury done to the forests and to the country by this most mistaken measure may never be recovered; certainly it cannot be recovered in less than two generations of the people's life. Such was one of the most material results of the utter ignorance of the administrative officers of that period regarding everything connected with the wilder portions of their charge. The mischief had been completed, and most of the timber speculators had bolted from their creditors, leaving their logs smoking in the forests, before the formation of the Central Provinces, and ere the Forest Department had entered on their labour of exploring and arranging for the protection of what was still worth looking after."

Fifty years have passed since this vivid description of the deplorable aftermath of the Mutiny was written, and the present state of improvement which scientific Forest Conservancy has already brought to these ruined forests forms an eloquent testimony to the high efficiency of the Forest Officers who have followed each other in the care of this great charge. It proved heartbreaking work at first, and another fifty years must in all probability elapse before the forests of this region can hope to have approached (not reached) to some degree of normality.

It will be remembered (I, p. 396) that during Brandis' visit to the Central Provinces and tour of inspection with Pearson in 1863 it had been settled that the latter should make an attempt to protect one or more of his forest areas from fire. That it would be possible to introduce into India

the protection of the forests from fire was openly derided by probably all district Civil Officers and most of the existing Forest Officers. That this attitude was a natural one to take up is easy to realise when the fact is borne in mind that from time immemorial the forests had been burnt annually over larger or smaller areas, either purposely to obtain an early crop of young grass with the arrival of the first rains or from sheer carelessness. Michael had made an attempt in the Anaimalais in the 'fifties without much success. Brandis himself whilst in Burma had stated that it was too early yet in the history of Forest Conservancy to attempt to introduce fire protection. Nevertheless, it was settled that Pearson should institute the first trial, and the areas selected with Brandis' approval were one block in the Bori Forest at the foot of the Pachmarhi Hills and a second block in the Jugmundel Forest of the Kormeyr plateau in the Mandla Hills. Both the forests selected for this purpose were capable of isolation by the natural features of the country, and were in other ways well adapted for the experiment. For carrying out the work in the Bori Forest, Pearson obtained the services of Lieutenant (afterwards Colonel) Doveton, 1st M.I. Pearson attributes the great success which was achieved in this, the first, attempt made in India at protecting a forest from fire to the unremitting zeal and watchfulness, as well as the tact shown in dealing with the natives, displayed by Doveton. The Conservator rightly adds: "It is impossible to overestimate the importance of this success, as most Foresters and every Civil Officer in the country scouted the idea of forest protection from fire and everything connected with it, and had the attempt been a failure any progress in fire-protection elsewhere would have been rendered immeasurably more difficult." Fire protection was to play a great part in Forest Conservancy in India in the future, and as Pearson subsequently generously affirmed it was to Doveton (and we may add to the Conservator himself who planned the scheme on which Doveton acted) that the subsequent progress was largely due, in his classic example of the Bori reserve.

Douglas had charge of the fire-protection work in the Jugmundel reserve. The work here was not at first attended with the same success as in the Bori reserve. This was in no way attributed to any want of care on the part of that officer, but was solely due to the hostility of the "ahirs" in charge of herds of cattle which were brought up from the lowlands to

graze in the Mandla uplands. These people wanted to continue to burn the grass for their own purposes. Many a Forest Officer since then has been placed in a similar position to that with which Douglas was confronted, as will be mentioned in a later chapter on the protection of the forests.

Forsyth was Acting Conservator in 1864-5, and his Annual Forest Progress Report for that year is a most interesting document, although unfortunately too long for reproduction here. In it he shows clearly the great progress made in the forest conservation work during the brief period the Forest Department had been in existence. Demarcation work still absorbed the energies of the Forest Officers, but much other work, including a commencement in the protection of the forests, was accomplished.

Brandis had drawn up an outline of the heads upon which the Annual Forest Administration Reports of the provinces and administrations should be prepared in order to secure uniformity. These heads were as follows :

- I. Survey and examination of forest tracts little known.
- II. Demarcation of Reserved Government Forests.
- III. Protection of the forests and work for their improvement.
- IV. Selection of trees to be felled, and yield of forests.
- V. Financial results.
- VI. General.

Forsyth gives a detailed description of the work which had been carried out during the year under head I. On the subject of valuation surveys he has some remarks which were very apposite for the period at which they were written : "Valuation surveys, to be of any value to work from, are dependent on the existence of a really reliable map of the forest to be valued. Where the forests are so irregularly distributed, as they everywhere are in the Central Provinces, it can only lead to a treacherous semblance of certainty to count the trees in a given small portion of the area, and then estimate the aggregate number of trees over the whole area by a simple process of multiplication—two all-important points not having been ascertained, viz. what the whole area is, and whether the part counted was of average richness in trees. It would therefore be, in a great measure, a waste of time to attempt a valuation survey of a reserved tract before the tract has been mapped. In the meantime, however, steps have been taken to record full and accurate data regarding

the rates of growth of various kinds of trees under different circumstances ; so that, when valuation surveys become possible, this equally necessary element in the calculation of the ' rate of supply ' will be available."

Under head II the total demarcation work accomplished during the year was about 500 linear miles round an area of about 830 sq. miles. The cost of this work was about 9 annas per linear mile. " The greater part of the reserved tracts in Baitool and Seonee have been notified in the *Gazette*."

On the subject of Protection and Improvements (III) Forsyth's remarks are illuminating and place the position of the provinces at this juncture in a clear light :

" The past year has been one of change and reorganisation in this Department. Up to its commencement it may be said that on one officer alone, the Conservator, lay the whole burden of the current forest work of the vast timber-bearing tracts of these provinces ; for although he had nominally two Assistants, yet, in point of fact, they lightened his labour but slightly ; for while one was almost constantly engaged on the unlucky work of the Beejoragoghur sleepers, and was therefore unavailable for any forest work properly so called, the other was as constantly engaged in exploring new regions, which had not been brought under a system of conservation ; nor was the work of the Conservator in any way lightened by aid from the district officers. In the Saugor and Nerbuda territories every patch of jungle, however small, was supposed to be directly attended to by the Conservator, and all applications to cut timber were referred to him. The natural result of this state of affairs was the centralisation of everything in the Conservator's office, who had to issue orders and make arrangements for every operation undertaken by the native establishment in the different districts, who alone was interested in the financial and fiscal state of the Department ; and who, consequently, was the sole depository of knowledge, regarding the resources, capabilities, etc., of the forests, and of the requirements of the market. The difficulties thrown by such an arrangement in the way of a proper system of conservation will be easily appreciated. The task was too vast for anyone to accomplish. The great distances between remote forests, and the necessity of visiting them all in the course of the year, together with the frequent interruption of postal communication when in the wilder parts of the Province, inevitably gave

rise to delays in the issue of necessary orders, and left open a way to malpractices and idleness on the part of the native subordinates. It is not to be wondered, then, if conservation remained in a backward state under this system. All that could be done was done ; and I may safely say that few men would have effected as much with the means at his disposal as Captain Pearson has done ; but still, there can be no doubt that the arrangements were totally inefficient to prevent waste and damage where contractors were admitted to cut ; and that, had more liberal measures been adopted at first, the available resources of the Province would have gone much further towards meeting the requirements of the country than they have done.

All this was seen, and the remedy has now been applied. The Province has been parcelled out into six forest divisions, and an Assistant Conservator has been appointed to the executive charge of each. In addition to this, the direct care of the extensive tracts which have not been reserved as Government forests has been entrusted to the district civil officers, with additional native subordinates paid from forest revenue to assist them. These and other new arrangements necessitated numerous changes in the administration of the Department. It had, in fact, to be decentralised. The executive charge of the work in each division had to be more fully entrusted to the Assistant in charge. The relations of the Forest Department with the civil officer in each district had to be adjusted with due consideration to circumstances. A more rigid system of check and account in expenditure and collection of revenue, by the native subordinates, had to be set on foot ; men had to be found fit to fill the newly created posts under the district officers, and in the offices of the Assistants. Changes were also called for in the system of disbursing pay and in the method of record in the offices. It was unfortunate that Captain Pearson was compelled, by the effects of exposure, to leave his work on the eve of all these changes, and that it fell on myself, who have but a temporary interest in the forests, to introduce them. I have endeavoured, however, in every case, to give effect to what I believed to be his views and would hope that not much of what I have done will require to be undone."

Forsyth was too modest. As we know Pearson was well aware that he could not have left his work in safer and abler hands. It was the last work which Forsyth was to undertake

for the Department, as on Pearson's return he was transferred to act as Settlement Officer for Nimar, and it has been shown how highly his Report on that district was commented upon by the Chief Commissioner.

Cleghorn, Officiating Inspector-General of Forests, reviewed Forsyth's Forest Report. He alluded to the extensive tracts of private forests existing in the provinces, and mentioned that "Mr. Temple was endeavouring to induce the great landholders to accede to certain rules in these forests, and to arrange leases with them. This procedure has been approved by the Secretary of State, and is important, if it can be done upon reasonable terms." He alludes to the agreement concluded with the Thakur of Pachmarhi for the management of his forests, and mentions the Ahiri teak forest south of Nagpur which "for many years supplied Hyderabad almost entirely with timber (I, p. 321), and appears to be the best source for supplying sleepers to the Nagpur branch railway. The preservation of this fine forest is of great moment, and any available opportunity should be taken advantage of to secure its transfer to direct management."

The aggregate forest area at this date was stated to be :

(1) Reserved Government Forests	2,880 sq. miles
(2) Unreserved Government Forests	11,000 ,,
(3) Private Forests	10,000 ,,
	— — —
Total	23,880 ,,

The forests had been divided into six divisions, as follows :

Northern.—Head-quarters, Jubbulpur. Officer in charge, Lieutenant Douglas.

Eastern.—Raipur, Lieutenant Plowden ; Central. Seoni, Mr. Jacob.

Western.—Hoshangabad, Mr. Cox ; — Pachmarhi. Baitul, Lieutenant Doveton.

Southern.—Nagpur, Lieutenant Noverre.

Orders had been issued that from January 1st, 1865, all trees were to be marked by Forest Officers before being felled. Outlying timber was said to have been all cleared out and the practice of tapping sâl trees for dammer resin had been forbidden. Forsyth had been interesting himself in minor products and had drawn attention to "the excellent gum of the *Dowra* tree (*Conocarpus (Anogeissus) latifolia*) ; and other articles of

forest produce have received attention. This branch of forest revenue is of increasing importance, and received an impetus from the success of the Nagpur Exhibition." Lieutenant Noverre had been placed in charge of the forestry part of this exhibition, which appears to have been an unqualified success.

The out-turn of timber for the year, a considerable increase on previous years, was 131,820 cubic feet, sâl and teak, valued at Rs.1,15,521; the greater part of this timber was obtained from trees girdled before the forests came under the sway of the Department, or consisted of logs left by former contractors. In addition the amounts received by permit-holders or contractors were: for Railways, sleepers, 76,624; logs, 6645; for Public Works Department, logs, 850. No record was kept of the amounts supplied or taken by towns and villages; but this record was to be kept in future.

Both revenue and expenditure had increased, as is shown by the following table:

Years.	Receipts.	Expenditure.
1860-61. . . .	45,812	17,284
1861-62. . . .	64,302	46,193
1862-63. . . .	53,169	60,341
1863-64. . . .	77,539	71,800
1864-65. . . .	89,306	97,356

The Report shows that a remarkably good commencement had been made, and gives evidence of the enthusiasm with which the Forest Officers had thrown themselves into the work.

The following extract, under "Elephants," from Cleghorn's review is of interest, indicating that the Khedda Department had transferred its activities, or a portion of them, to the Central Provinces:

"The Superintendent of Kheddass, appointed in March, 1865, has been successful in his operations, and the Conservator desires that some of the captured animals may be made over to the Forest Department. The result is most important, as elephants have not been procurable for some years in Hindustan proper, at anything like the sanctioned prices, to fill up the complement allowed. The advantage to the State of catching, instead of shooting, these most useful animals is very great. It seems opposed to reason to offer rewards for

destroying animals (except when dangerous to life or property) which cannot now be purchased in many districts for less than Rs.1,500 to Rs.2,000 each. The importation of elephants from Ceylon is about twenty annually, and the captures in Cochin and Travancore average about ten. In Burma and Siam the number is still large, but the expense of transport is very heavy. It is desirable to avoid the importation of these animals as much as possible."

Fired by the success of the Nilumbur teak plantation in Malabar, Pearson wished to commence the formation of similar plantations in the Central Provinces and was supported by Brandis. The localities chosen for the plantations were sites on the banks of the Nerbuda near Mandla and on the Tapti River in Betul, and the Government of India were asked to sanction the entertainment of a Scotch Forester to be attached to the Province in order to supervise this work. A salary of Rs.150 per mensem was deemed sufficient, the covenant to be for a term of five years. The Government of India accorded their sanction to the proposal and in their letter to the Secretary of State on the subject (Rev. For., No.11, dated 21st November, 1864), asking for his consent, wrote : " It is proposed that the time of the Forester should be mainly given to the improvement of the forests and the formation of plantations, as well as in instructing and training the native subordinates in forestry, but his attention might likewise be directed to the growth of coffee, cinchona and other economic products under the orders of the local administration." Which shows that enthusiasm had been aroused through the success attained by the development of these industries in other provinces, but betrays how little the fact was realised that the success attained in one part of India would not necessarily be realised under different climatic conditions in another—a point which it is equally necessary to bear in mind elsewhere in our Empire at the present day—if money is not to be frittered away in experiments which, based on inadequate knowledge or data, have from the outset no chance of achieving success.

As we have seen (p. 44), two Scotch Foresters were sent to the Central Provinces. If they carried out half of the duties allocated to them they must have had a busy and interesting time.

In 1865 Forsyth, as Officiating Conservator, submitted a detailed and excellent Report on the Nimar Forests which had

recently been placed under the Forest Department. In their Resolution (dated 8th August, 1865) on the subject forwarded to the Secretary of State with their letter (Rev. For., No. 27 of 25th November, 1865) the Government of India conveyed the following orders in the matter, subject to the former's confirmation :

" Formerly the forests were under the control of the Revenue Department, and the establishment employed in looking after them was paid out of the revenue derived from them. The receipts for 1863-4, and the three previous years, amounted to Rs.14,664, and the charges to Rs.3,388, showing a net surplus of revenue of Rs.11,276, as follows :—

Years.	Revenue.	Charges.
	Rs.	Rs.
1860-61 . . .	2,003	373
1861-62 . . .	2,523	370
1862-63 . . .	3,774	855
1863-64 . . .	6,364	1,790
Total . . .	14,664	3,388

The actual cost of establishment previous to 1864-5 is not stated, but in that year it was increased to Rs.329 per mensem, and the forests were incorporated with the Central Provinces, and placed under the charge of an Assistant Conservator temporarily appointed for this purpose.

The forests of Nimar divide themselves into three distinct lots, those of the Nerbuda, those of the Tapti and the Central ; but the last scarcely deserve the name of forests, consisting of underwood and scrub, and are not to be reserved, but offered for sale under the Waste Lands Sale Rules. Of the first it is intended to form a reserve, and the second are to be placed under the district authorities.

The 'Nerbuda Reserve' will consist of the four following tracts, viz., the Burwai tract, the Neemunpoor Mukrar tract, the Chandgurh tract and the Poonassa tract. But in order to secure the effectual formation of this reserve, it has been necessary to enter into negotiations with the Powar of Dhar for the Neemunpoor Mukrar tract, which juts into and divides the other tracts. These negotiations, it appears from the

Abstract of Proceedings of the Chief Commissioner for the month of June, 1865, have been brought to a successful issue. The reserve, thus constituted, will form one compact forest, covering an area of about 400 square miles, calculated, with proper administration, to yield a revenue of about Rs.20,000 per annum. While stated to be second to none in the Central Provinces, its resources will be fully taxed to supply the demands of the Malwah, Khandeish, and Deccan markets, when opened up by the railway."

The establishment proposed for managing this reserve comprised 1 "darogah," 3 "duffadars" and 12 "chuprassis," or guards, at an annual outlay of Rs.2,232. This establishment was to replace the portion of the Revenue Establishment which had been employed on the forests throughout the Nimar District. This latter establishment had cost Rs.3,948 per annum and was now to be dispensed with.

The following paragraph in this Resolution shows how difficult it was for the Revenue authorities to disassociate themselves from the old regime under which the forests had been so long mismanaged :

"As already stated, it is not intended to form the Tapti Forests into a reserve until at least they have recovered themselves ; but they are to be withheld from sale under the Waste Lands Sale Rules and to be placed under the control of the district authorities to be eventually farmed out. A temporary establishment is proposed to be employed in collecting the forest dues during the current year, its cost, Rs.132 per mensem, being met from the receipts, which may be allowed, as the system will cease with the present year. In this way a valuation of the farm will be obtained as a guide in putting it up to auction. A 'darogah' and four 'chuprassis,' the latter on Rs.6 each, will also be required to carry out the orders of the district authorities ; but the former, it is stated, can be supplied from the present sanctioned scale of Establishment for the Central Provinces. The additional expense will therefore be on account of the four 'peons' only, or Rs.288 per annum ; and if these are required permanently a tabular statement should be submitted. The Chief Commissioner estimates the net profits from the Tapti Forests at Rs.5,000 per annum, after paying the temporary establishment."

It is difficult to see on what grounds any hopes could have been

recently been placed under the Forest Department. In their Resolution (dated 8th August, 1865) on the subject forwarded to the Secretary of State with their letter (Rev. For., No. 27 of 25th November, 1865) the Government of India conveyed the following orders in the matter, subject to the former's confirmation :

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uniform measures of conservancy may prevail throughout the whole of the district."

In July, 1864, the Chief Commissioner had proposed to divide the territory over which the operations of the Forest Department extended into six main divisions, each division to be made the separate charge of an Assistant Conservator, with the requisite establishment, the whole to be under the general supervision and direction of the Conservator. This proposal was referred to the Financial Department, Government of India, the Chief Commissioner being at the same time requested to furnish a statement of the income present or prospective that might be expected to meet the new charge, and a sketch map showing the area of the proposed divisions, and the extent to which the district Civil Officers could co-operate in forest management.

The following were the recommendations made :

- " I. The partition of the forests in the Central Provinces into six permanent divisions.
- II. The permanent appointment of an Assistant Conservator to each division ; three on Rs.500 each and three on Rs.400 each.
- III. The revision of the subordinate forest establishment, and the final adoption of the establishment now recommended.

These measures involve an addition to the present scale of establishment of Rs.201 per mensem, raising the permanent cost thereof to Rs.6,252 per mensem, or Rs.75,024 per annum.

The six divisions, which it is proposed to make permanent, are already constituted as follows :

- A Division, comprising the districts of Saugor, Damoh, Mandla, Jubbulpur and Bijoragoghurh.
- B Division, comprising Raipur, Bilaspur, Sambulpur (the Chutteesghur Division).
- C Division, comprising Nursingpur, Seoni and two-thirds of Chindwarra.
- D Division, comprising Nimar and two-thirds of Hoshungabad.
- E Division, comprising Betul, one-third of Hoshungabad, and one-third of Chindwarra.
- F Division, comprising Nagpur, Bhundara, Chanda, Wurdah and Upper Godavery."

PROGRESS IN THE CENTRAL PROVINCES 235

The following table shows the area of each division, and the establishment proposed to be employed under the Forest Officers, exclusive of Office Establishment :—

Forest Divisions.	Area Square Miles.	RESERVED FORESTS.				UNRESERVED FORESTS.			TOTAL NUMBER OF		REMARKS.
		Number.	Area Square Miles.	Number of Rangers.	Number of Watchers.	Area Square Miles.	Number of Rangers.	Number of Watchers.	Rangers.	Watchers.	
A	16,342	9	520	4	17	1,500	—	4	4	21	There are 30 other watchers of whom the distribution is not shown. They are probably employed in the Unreserved Forests.
B	48,292	2	30	1	2	1,000	—	1	1	3	
C	9,817	5	769	4	18	1,100	1	2	5	20	
D	8,525	2	750	4	15	1,500	—	2	4	17	
E	6,041	7	401	5	20	1,400	1	3	6	23	
F	16,000	4	408	2	8	1,500	—	—	2	8	
Total	105,017	29	2,878	20	80	8,000	2	12	22	92	

Though much has been done in the way of demarcating reserved forests, yet much remains to be done. The unreserved forests are only beginning to yield revenue. These last are under the charge of the Civil Officers, who are aided by "darogahs."

The Chief Commissioner is of opinion that, even after the forests are in proper working order, the development of operations will demand the retention of the same number of Assistant Conservators as are now employed, of whom four are permanent and two temporary; and the main object of the present proposal is to obtain confirmation of the two temporary appointments.

It is observed that, in a recent Despatch on the progress of forest management in the Central Provinces during the year 1863-4, the Secretary of State remarked as follows :

" Para. 3. There is, however, much to be done before the system is really established, and it seems evident that, without a larger staff of European officers to act as Assistant Conservators than the Department has hitherto had, the progress cannot be as rapid nor as satisfactory as could be wished. The six divisions among which the work of such districts as are brought under conservancy is apportioned are very extensive, and require each an Assistant Conservator; and it is not, as Mr. Temple remarks, desirable that the Conservator himself should undertake the direct management of any one of these divisions. There are, however, only four of these

officers for the six divisions, and even these divisions do not comprise the whole of the forests which require superintendence; a most important block, all the forests from Deogurh in the west to the Lanjee Hills in the east, being left out of the arrangement. Dr. Brandis, from his great experience in forest matters, urges the necessity of valuation surveys of the forests being taken, and the importance of the selections for cutting being all made by competent officers. He approves the formation of provisional reserves, from which ultimately the actual reserves will be taken. This measure, although it will render more supervision necessary at first, will, it may be expected, ultimately require less.

It will, I am of opinion, be a short-sighted policy if we stint the measures of conservancy, more particularly at this time, when their importance is recognised not by ourselves alone, but by the owners of private forests, and when the requirements of the railways in India have opened a fresh market for timber, by the demand for wood for sleepers, and for other purposes connected with the construction of the lines."

The remarks in the first paragraph of this extract are not altogether applicable to the present time, but in other respects there is much force in them.

Other modifications in the existing establishment are also proposed, involving both increases and decreases as shown in the following table:—

No.	Offices.	Present Pay.	Proposed Pay.	Alterations in Salaries		Addition to Scale.
				Increase.	Decrease.	
	<i>Conservator's Office:</i>	Rs.	Rs.	Rs.	Rs.	Rs.
1	Asst. Moonshree .	20	30	10	—	—
	<i>Conservancy Establishment:</i>					
1	Darogah (Forest) .	70	60	—	10	—
1	Darogah (District)	80	50	—	30	—
2	Darogahs (")	70	50	—	40	—
1	Darogah (")	—	50	—	—	50
2	Rangers . .	10	20	20	—	—
1	Ranger . .	—	20	20	—	20
83	Watchers . .	5	6	83	—	—
18	Watchers . .	5	7	36	—	—
2	Watchers . .	5	8	6	—	—
7	Watchers . .	—	8	—	—	56
	Total .	—	—	155	80	126

Net Increase 75 + 126 = Rs. 201.



A LOCAL TYPE OF CART TERMED A "SARAI" CARRIES 2-4 SAT. SLEETERS ACCORDING TO
WHETHER IT IS DRAWN BY BULLOCKS OR BUFFALOES. SINGHU M CHOLA, NAGPUR, 1897

Photographed by Jackson

The proposed additions consist of a "darogah," a ranger and seven watchers.

The "darogah's" services are required for the Wurdah jungles, in which there is much promising young teak, for the conservancy of which its proximity to Nagpur and the Great Indian Peninsula Railway makes it particularly desirable to provide. The ranger and three of the watchers are required for the recently selected reserves in the forest division, and the remaining four watchers are for the Nimar Forests, having, through inadvertence, been omitted from, though referred to in, the former proposals for Nimar."

It will be observed that it was proposed here to have a graduated scale of pay for the rangers and watchers or forest guards. With reference to the decrease in pay of the "darogahs" it was explained by Forsyth that where these men were in classes, and prospects of promotion were held out, a good "darogah" could be obtained for Rs.60 per mensem.

With reference to the "darogahs" at the time employed in the Forest Department the Resolution said :

"An inspection of the scale of forest 'darogahs' indicates defective gradation; and as there seems no difficulty in securing 'darogahs' within the limit of Rs.60, and as in the re-casting of the present scale of district 'darogahs,' there is a reduction in its cost, notwithstanding the increase in strength, it appears to His Excellency in Council that the scale of forest 'darogahs' might be modified as follows, reducing one on Rs.80 to Rs.60.

One 'darogah,' Rs.150; 2 'darogahs,' Rs.80 each; 2 'darogahs,' Rs.70 each; 4 'darogahs,' Rs.60 each; 6 'darogahs,' Rs.50 each; 3 'darogahs,' Rs.40 each. Total, 18 'darogahs,' costing Rs. 13,320 per annum.

The cost of the total Forest Establishment of the Central Provinces on the scale now proposed, but modified as indicated above, would amount to Rs.6,232 per mensem, or Rs.74,784 per annum, as follows :

Conservator, monthly, Rs.800; Assistant Conservators, Rs.2,700; Office Establishment, Rs.375; Conservancy Establishment, Rs.2,357. Total, Rs.6,232."

The Secretary of State agreed to these proposals and added :

"I think it highly important that it should be impressed on all Assistant Conservators that it is part of their duty to endeavour to train the natives employed in subordinate forest

posts so as to form them into an efficient staff, and give them an interest in the work of the Department. This is an object which will, of course, be only gradually attained, but it is one which the superior European officer may further very much by personal attention and influence."

Allusion has already been made in this chapter (p. 228) and in Volume I to the Ahiri teak forest and the fellings which had been made in it from time to time. This forest was situated on the Pranheeta River, south of Nagpur, and had long been known. Brandis, in his review on the Forest Administration Reports for 1865-7, had alluded to the importance of obtaining a lease of this forest, which was in private ownership. Little information, however, as to its character and extent was on record, and Pearson, on his return from leave, made a careful inspection of the area in January, 1867. He estimated that the forest contained the following teak trees :

60,000 teak trees 6 feet in girth and upwards.

100,000 teak trees from 3 to 6 feet in girth.

The owner was willing to lease the forest to Government, but at the time a satisfactory arrangement could not be made owing to the existence of a felling license held by a native timber merchant, four years of which had yet to run. It was possible, however, under this license to supervise the fellings, and the Government of India desired that the Conservator should in future issue orders as to the trees to be felled, and an establishment was sanctioned to exercise a careful supervision over the license-holder. These were Pearson's recommendations.

This forest contained, Pearson stated, a very valuable supply of teak which, owing to the absence of the practice of *dhya* cultivation, had been little damaged.

In reporting to the above effect to the Secretary of State, the Government of India (Rev. For., No. 9, dated 6th April, 1867) also stated : " We have also to intimate the discovery of another teak forest in the Panabaras zemindary, on the Wyngunga River. Both teak and sissoo are found in this tract. We have called for an approximate enumeration of the mature trees before sanctioning the saw machinery recommended by Major Pearson. Both forests (i.e. the Ahiri also) have been placed under the management of the Forest Department, and a liberal seigniorage of three annas per cubic foot of teak is to be paid to the proprietors. We have directed

that all waste should be prohibited, and that conservancy shall be as strict as circumstances will allow. These two forests may be looked upon as sources of supply for renewing the sleepers on the Nagpur Branch of the Great Indian Peninsular Railway."

The Secretary of State's reply (Rev. For., No. 20, dated 29th June, 1867) is not without value, owing to the fact that he alludes to one or two points of interest at this period in the history of the forests. The first is his insistence on the necessity of introducing saw machinery into the working of the forests, a factor which he had occasion to press on the authorities for Sind (I, p. 362, etc.). A second is his comment on Pearson's remark with reference to "girdling." A third is the far-sighted view taken when he points out that inferior species of trees at the time unsaleable might prove utilisable at a later date and therefore should be protected. The reply is as follows :

" I approve your proceedings in sanctioning the measures proposed by Major Pearson for the management of these forests. They appear, from Major Pearson's careful inspection of them, to contain a very valuable supply of timber, which, fortunately, from the absence of the practice of *dhya*, has been very little damaged. It is satisfactory to find that the ' zemindars,' in whose estates the forests are situated, are anxious that they should be placed under proper conservancy. This, however, will not be completely the case, I presume, until the felling license of Bhugwunt Dass expires. Much injury will, however, be prevented by this license being under supervision, as it will be, by the Forest Department.

The possession of these forests promises to be of the greatest benefit, not only in supplying the demands of the railway, but of the community in general. There are some expressions in Major Pearson's Report which might lead to the supposition that there would be no use in protecting more than the more valuable kinds of timber, such as teak and sissoo, but great caution should be exercised in giving up any tracts which contain only inferior timber, so long as it is of a kind which may be available for fuel.

The use of saw mills in the forests, which is suggested by the Conservator, has been more than once recommended by the late Secretary of State, Sir Charles Wood, in Despatches not only to Your Excellency in Council, but also to the Govern-

ments of Madras and Bombay, and I cannot but think that if well-adapted saw mills are brought into use in the forests, the result must be a considerable economy both of labour and of material. You will report to me the result of the further enquiry which you directed should be made with respect to the employment of such machinery in the Panabaras Forest.

I have not failed to observe the remarks of Major Pearson, in paragraph 21 of his Report of the 19th of February, in which he attributes the soundness of the timber in the Ahiri Forest, after three or four years of exposure, to the circumstance of its having been felled *without girdling*, whereas he asserts that all the Burma logs which he had seen were heavily cracked. This statement should, I think, be communicated to the Conservator of Forests in Burma."

The Forest Administration Report for the Province for 1865-6 showed that the work of demarcating the reserve forests proceeded with unabated energy, whilst some measure of success was introduced into the management of the unreserved forests by the district officers in whose hands they still remained. The efforts being made to put a stop to "dhya" cultivation were meeting with success. The practice still existed in the remoter parts of Mandla. The Chief Commissioner, however, "feels confident that the measures which have resulted in the almost total extinction of the practice in Betul will eventually be successful in Mandla."

Four sites for forming teak plantations had been selected : (1) On the Tapti, near Jowra ; (2) on the Mechna, above Shapoor ; (3) on Towah, near Ratakhas ; (4) on Bomeyr, in Mandla. Messrs. Davidson and Grahame, the two Scotch Foresters who had been appointed to the Province, had been located in these areas. Pearson had also in view the formation of babul plantations "all over the black-cotton soil plains of the Nagpur and Wurdah Districts, and had applied to the Conservator of Bombay for seed from Sind. Plantations of eucalyptus and acacia were to be tried in the Pachmarhi Hills, as also the "chir" (*P. longifolia*) and mahogany. The attempt to make a cinchona plantation in the cold-weather season had failed, and Pearson proposed to renew the attempt by obtaining a consignment of trees from the Nilgiris in the rainy season. Pearson also started measuring certain known trees in the Residency at Nagpur (teak, sissoo and babul) and proposed to repeat the measurements annually to obtain data on rate of

growth. He had recommended his forest staff to commence carrying out similar measurements. Absorbed in their heavy work of demarcation and other jobs it was stated that "the request has not been generally responded to." And we can well imagine that it had not. The work of the divisional officer of those days must have been very heavy—even the purely physical work combined with the very rough conditions of living.

It is of interest to remember that at this time the Settlement Officer was at work in the districts, and that the demarcation of the forests in many parts was held up until the Settlement Officer had finished his part of the business.

As regards the financial results of the year the Chief Commissioner considered them to be good: "The creditor side of the accounts shows $4\frac{1}{2}$ lacs for 1865-6 against $2\frac{3}{4}$ lacs for 1864-5; the *real* uncollected outstandings of the year are only Rs.30,000 against more than a lac in the previous year. Striking out for both years the value of stock in hand at the beginning of the year and also the sums realised on account of outstandings of previous years, the yield of the year 1865-6 is Rs.2,50,000 against Rs.2,05,638 in the year 1864-5. Your anticipations that next year's yield will be still larger seem to be well grounded; and it is hoped that still more regularity in the collection of the outstanding claims of the Department may be secured."

The Administration Report for 1866-7 was able to record that "the Government Forests of these provinces have now been everywhere explored and their timber-bearing qualities are known." The demarcation of the reserves had been nearly completed. In his review on the Report the Chief Commissioner remarked: "The boundaries of the important reserves of the Pachmarhi, Jubbulpur and Seoni Divisions are now well known to the people, and are for the most part respected. Even if it should be found, for the future, too expensive to clear yearly the paths round the larger reserves, it will always be possible to verify everywhere that the permanent boundary-marks are unremoved and in good repair." The Review continued:

"It is satisfactory to learn that the work of surveying the forest reserves is beginning. When reliable maps on a sufficiently large scale shall have been made, it will be comparatively easy to keep the limits of *reserves* clear, so long as the

boundary pillars are standing. Your proposals for effecting a valuation survey of the Ahiri Forest, in view to the fullest utilisation of its teak, received Mr. Temple's approval.

Now that the reserves have been marked off, no 'dhyas' are cut within their limits; and no unauthorised attempts are made to cut timber or collect forest produce within reserves. Indeed, it would seem that your Department has been quite successful in maintaining the forest rules in reserved forests. The forces against which reserves have to be guarded are fire, and the luxuriance of nature itself. It seems to be very difficult entirely to exclude fire from the larger reserves. But Lieutenant Doveton appears to have been fairly successful in the Bori reserve. His remarks regarding the gradual disappearance of grass in parts of the forest when the annual fires do not occur are interesting. And the Officiating Chief Commissioner desires that the matter may be noticed in future Reports. The device simultaneously suggested by your two most experienced Assistants of keeping out destructive fires, by firing the grass earlier in the year when it burns slowly and harmlessly might, unless you saw reason to the contrary, be tried on a small scale next spring."

Here we have the first tentative beginnings of that great system of fire conservancy which was gradually to embrace all the Government forests of the country in its gigantic web, perhaps the most striking performance of the Forest Department in its young days.

This Report also alludes to the commencement which was being made with communications, Rs. 14,000 having been spent on this work. A good forest road had been made between the Topla sál forest and the Upper Nerbuda Valley, and another termed the Delakaree Forest Road. Both of these were considered to be as useful to the district and people as to the Department.

Pearson made a visit to the Nilumbur teak plantations during the year and returned fired with a determination to repeat those good results in his own Province.

The position of the Unreserved Forests of the Province is well dealt with by the Officiating Chief Commissioner in his review upon this Report :

"The Government wastes and jungles, which are administered as 'unreserved' forests, cover about 21,000 square miles of country. They occur, though in varying proportions, in

every district of these provinces. They are managed by the local civil authorities, who, in this branch of their duty, enjoy the supervision and advice of your Department. From the 'unreserved' forests, and from the private forests (Malgoozaree and Zemindaree) with which they are interspersed, the population of the Central Provinces and of a part of Berar (about ten millions of souls) draw their supplies of petty timber, of bamboos, of firewood, of grass, of 'mowah' flower (used for distilling liquor), of lac, gums of various kinds, and of other miscellaneous forest products. At paragraphs 27 to 31 of last year's forests' review, Mr. Temple explained at length the manner in which these wastes had now been formally declared to be the property of the State. It is therefore now only necessary to advert to the manner in which the 'unreserved' forests were managed, and to the revenue they yielded in the year under review. For this purpose it will be best to consider each division or commissionership in the order adopted by yourself.

In the Jubbulpur Division a revenue of Rs.47,914 was realised in the year 1866-7, as compared with Rs.29,785 in the preceding year, by the lease of the right to collect the natural products of 'unreserved' forests. The increase is spread over every district of the division; and the District of Jubbulpur alone has not hitherto succeeded in yielding a forest revenue proportioned to its importance. As explained by the Deputy Commissioner, this failure is in part due to certain omissions in the Settlement Department, which have been rectified during the year under review.

The yield from annual usufruct leases of 'unreserved' forests in the Nerbuda Division was Rs.69,262 for the year 1866-7, against Rs.39,417 in the preceding year. The Officiating Chief Commissioner is satisfied that, in every district of this division, forest revenue is carefully fostered, and that forest laws are maintained, while at the same time the interests and habits of the hill tribes are fully cared for.

The revenue from 'unreserved' forests in the Nagpur Division has risen from Rs.33,075 in the year 1865-6 to Rs.60,254 in the year under review. In the Bhundara and Chanda Districts, where there are large jungles well administered, a still higher revenue will, you anticipate, be realised. In the Nagpur District also, where there are such large centres of population, and where the demand for forest products must be great, the jungles of Bherogurh, Ramteak,

Oomrair, and of the Katole Tehseel, will doubtless yield an increasing revenue.

In last year's review it was noticed that there was hardly any forest revenue from the Chutteesgurh Division. The returns for the year 1866-7 evince some improvement in this respect, as Rs.5,000 of forest revenue were realised. But the Officiating Chief Commissioner considers that the local civil authorities must not be satisfied with this small advance. He is glad to learn from a note to your Report that the unreserved forests of Raipur alone will yield more than Rs.12,000 during the year 1867-8.

In the Upper Godavery District a forest revenue of Rs.12,295 has been raised in the year 1866-7, as compared with Rs.4,986 in the foregoing year. And this considerable sum has been collected without in any way inconveniencing the comparatively sparse population of the district.

Besides the very considerable increase in the revenue, from Rs.1,07,000 to Rs.1,95,000 in this the second year of regular administration of our 'unreserved' forest, there are other satisfactory features in this branch of forest management during the year 1866-7. The people have everywhere become accustomed to, and almost everywhere have become satisfied with, the forest laws. Not only is the annual produce of Government forests more thoroughly utilised than before, but the forest regulations have had the effect of making landholders work more fully their own wastes. Much valuable labour, which in former years was devoted to gathering, in an unsystematic fashion, the fruits of boundless forests, or to wasteful methods of cultivation, has now been directed to reclaiming lands from the jungle, or to making the most of the natural products over a well-defined area of waste. Even the Bygars of Mandla are beginning to use the plough, and to reside in fixed habitations. Not only are prosecutions for breaches of the forest rules exceedingly rare, but there are very few complaints made regarding the stringency of the law. Much of the smoothness with which the system works may, as you observe, be attributed to the circumstance that landholders often become lessees of the waste lands in their neighbourhood. Lessees of this kind are usually less harsh and strict with the people than professional contractors from a distant town would be. Moreover, the landholder can realise his fees with much less expense than a stranger could do. In one respect only, namely, the payment of grazing fees by

brinjarras (pack-bullock owners), did any allegation, that the rules were harsh, reach the Chief Commissioner. In that case, after due enquiry, the strictness of the rules were relaxed in favour of brinjarras travelling through the forests.

It is to be remarked that the rules are, as yet, in one point, namely, the granting of permits to cut timber, nearly inoperative. Most of the District Officers report that the local market has been sufficiently supplied with timber ; that people are now using cheaper, though equally serviceable, sorts of wood, where they used to use teak, and that the private (Malgoozaree and Zemindaree) forests furnish enough timber to supply present wants. But the Officiating Chief Commissioner is disposed to think that in many cases permits are not applied for, merely because the people do not know that such applications would be granted. And this impression gains strength from the circumstance that, in one or two districts where special pains were taken to make known this clause in the rules, many permits were applied for towards the end of the year. Mr. Morris would draw the special attention of Deputy Commissioners to the necessity of thoroughly making known the provisions of the rules in respect to the cutting of timber under permits. In the instructions to district forest ' darogahs,' which were issued during last year, it was particularly laid down that district officials were bound to see that the local markets were sufficiently supplied with timber. The attention of local Forest Officers should be more and more directed to this matter ; otherwise there will be risk that, while we are protecting our forests for the good of future generations, the present population may be straitened by the want of timber for architectural, farm and domestic purposes."

The Officiating Chief Commissioner (Mr. Morris) thus summed up the position :

" It may fairly be said that the forest system of the Central Provinces had become firm and consolidated just before Mr. Temple, its founder, left this administration. Reserves have been marked off and brought thoroughly under regular conservancy. The forests have been everywhere explored. The ' unreserved ' forests have been defined, and a regular system of managing them has been for two years in successful operation. The Forest Department will have to work the reserves, and selected private (Zemindaree) forests in such a

way as to satisfy the wants of the timber trade of these provinces. The railway has now been opened to our chief cities and through our most populous tracts. It can bring to Jubbulpur 'sâl' logs from the Nepal Terai, and it can deliver at railway stations at cheaper rates than the timber of your Department has fetched during the last two years. Perhaps, then, the rates hitherto existing, namely, Rs.2½ and Rs.3 a cubic foot for teak will fall; and the efforts of your Department must be directed to cheapening the cost of felling timber and getting it out of the forests. The Officiating Chief Commissioner will watch with anxiety the results of the next two years' work in the Ahiri and Panabaras Forests, whence, if from anywhere, must come the local supply of large logs to compete with Moulmein timber. In the management of 'unreserved' forests, the local officers must, by a steady elaboration of the present system, strive for an increasing revenue, and they must take care that the people under their charge do not suffer any inconvenience which a liberal administration of the law would obviate."

The above Report gives evidence of the quite extraordinary progress which the introduction of Forest Conservancy had made in a comparatively short time in the Central Provinces. It may be admitted that the conditions were different from those of Bombay, but these alone do not explain the sharp contrast. To the conjunction of such hard-working and far-seeing and gifted men as Temple, Pearson, Forsyth and Doveton, to mention but four, assisted whole heartedly by the District Officers, must be attributed the rapidity and success the work had reached at this date.

As a result of some remarks made in the Wurdah Settlement Report (September, 1866) on the subject of the destruction of the forests in the Satpura Range, and in view of the fact that proposals were on foot with reference to the construction of irrigation works in the Wurdah District, the Conservator was called upon to furnish a Report on these forests and on the asseverations made that the injudicious fellings were affecting the climate and soil of the district. In a letter dated 22nd May, 1868, the Conservator reported as follows on this matter :

"I have been in communication with the Commissioner of Nagpur and the Deputy Commissioner of Wurdah during the past year regarding the propriety of protecting the jungles all along the north frontier of that district, from the Wurdah

River in the west to the Bori River in the east, and within the last few days only I have received final consent from the Commissioner of Nagpur to the measure. The ground was inspected last November by Captain Jarrett, and previously, in March, by myself; and it only remains now to submit a scheme for sanction to reserve the forest from sale under the Waste Land Rules, which shall be done as soon as the work connected with the Annual Report, which is now in hand, is completed. In the meanwhile actual protection is being carried out by an establishment entertained for the purpose.

I may state, however, that these forests have long ago been exhausted by the demand for fuel and building timber in the plains of Wurdah, and that they suffered very little by the railway works, and that they are not likely to be in a position to give anything to the railway for many years to come.

In continuation of the subject, I may state that there is now an almost continuous belt of reserved forests extending from Ummurkuntuk in the east to Asseergurh in Nimar in the west, all along the range of the Satpuras. Commencing from the east, the sâl forests extend for 150 miles from Ummurkuntuk to Rengakhar, and close attention is now being given to them. Next to them come the great bamboo forests of Saleetekree, which are up to the present date positively untouched, and present a belt of bamboos 40 miles broad. West of the Wungunga, the great Satpura reserve extends for near 150 miles, succeeded by the smaller reserve of Deogurh at the head of the Kanhan River; west, again, the protected forests of the Melghat in Berar, the Wurdah reserve, and the Kaleebheet reserve fringe the various ranges into which the Satpuras become split up. The forests have in past years been devastated, it is true, but certainly there is ample protection now along the whole range of "ghâts." What is wanted now is care for the groves of trees in the plains, the protection of those which exist, and the planting of others to come on in future."

Here, as elsewhere in India, the fears expressed on the subject of the water supplies available in the Wurdah District were not due to the action of the Forest Department at this date, but were to be sought in the unrestricted destruction to which the forests had been exposed for so long in the past. The forests were now under conservation, but it would take

many years of care to rectify the damage due to ignorance and carelessness to which they had been exposed.

As distinct from the Forest Conservancy operations allusion may be made to the purely arboricultural work which was being carried out at this time in the provinces. A long and most interesting Report was issued on the progress of this work for 1868-9, under which it is apparent that the Civil Officers of the districts and the Public Works Department (the latter had 33 small nurseries) were prosecuting this work with vigour and the former were enlisting the co-operation of landowners. The main features of the work were the formation and maintenance of nurseries, where required, and the planting of groves and avenues along the district roads. A considerable number of the nurseries were under the care of the landowners. For instance, of 28 nurseries in the Nagpur District 22 were managed by landowners. In some districts the landowners were so interested in the planting that the District Officer had no district nurseries under his own superintendence. The districts in which the landowners took the greatest interest in arboriculture were Bhundara, Hoshungabad, Bilaspur and Sambalpur. In the former district the landowners had 158 nurseries. The sum expended by local funds on arboriculture amounted to Rs.50,716 in the year.

This wonderful progress and the interest aroused in a work of so great an importance in a climate like the Indian one was properly accredited to Temple, the late Chief Commissioner, who had practically formed the Province. He was following in the footsteps of the great Emperor Akbar, who had always been so interested in arboricultural work (cp. I, p. 32).

A noteworthy remark in the Forest Report for 1867-8 is "that the Bori Forest in the Western Division has now been preserved from fire for the fourth year." This was rightly regarded as a great success. The plantation work was not equally favourable, however. "It is unfortunate," wrote the Chief Commissioner, "that the results attending the establishment of plantations of forest trees has been so little favourable, and afford so little encouragement." The revenue showed a considerable increase but the surplus was small.

Pearson had been transferred to the N.W. Provinces, where he carried out a great work, as will be shown, and Doveton had been appointed Conservator. Unfortunately soon afterwards the latter had to go home sick, and the Report for the succeeding year, 1868-9, written by Jacob, Officiating Conservator, showed

the influence which the Department had felt by these changes. In 1867-8 the surplus had fallen (from Rs.239,237 in 1866-7) to Rs.137,392 and in the following year the surplus was Rs.56,360 only.

Commenting on these results of the two years the Government of India wrote (No. 30, F., dated 14th January, 1870) :

“ At the present time the financial results of your forest administration demand the first notice. They have not resulted in any considerable surplus during the two years under review, and the perusal of these Reports has convinced His Excellency the Governor-General in Council that strict economy must be rigorously enforced in the forest administration of the Central Provinces. It is abundantly proved by the facts brought forward in these and previous Reports that the stock of growing wood and timber is extremely poor and scanty in those forests under the control of the Department in the Central Provinces which are at all near a market, or conveniently situated for the export of timber and other forest produce, and that all those forests which still contain valuable timber are difficult of access, and at a great distance from any market. These facts have to be fully borne in mind while considering the financial results of forest management in the Central Provinces.”

The receipts had practically remained stationary during these two years, whilst the charges had increased from Rs.212,099 to Rs.294,654. The review continued :

“ These figures show that the charges have grown nearly in the same proportion as the receipts ; and though to a certain extent this result is justified by the circumstances of the case, yet it appears quite necessary to insist on greater economy in future. The Governor-General in Council is convinced that the first step towards a more economical management is to make the Conservator of Forests responsible for an efficient control of the whole expenditure, and to afford him the needful means for exercising this control. It appears that, under existing arrangements in the Central Provinces, the Divisional Forest Officers render their accounts direct to the Accountant-General, and that the Conservator of Forests has no share in the control and scrutiny of the expenditure in detail. The Government of India is disposed to consider that the increased importance of the Department now demands the establishment

of an office of forest accounts under the Conservator's control, and if this arrangement can be made without any considerable increase of expenditure, the needful measures might with advantage be taken at once.

It may be necessary, temporarily at least, to attach an assistant to the Conservator's office for this duty, who will compile and scrutinize the accounts during his absence from head-quarters. An additional officer cannot be sanctioned, but the staff at the Conservator's disposal appears to His Excellency in Council to be sufficiently numerous to admit of an officer being made available, and I am directed to request an early Report on this subject.

Of the different items of charges, timber expenses have risen from Rs.19,441 in 1864-5 to Rs.97,629 in 1868-9. As this outlay is necessary for the realisation of a considerable portion of the forest revenue, its increase cannot reasonably be objected to, but I am directed to urge the most rigid economy in the disposal of the funds expended on this account. The large increase under purchase of stock and cattle, and keep and feed of the same, amounting in 1868-9 to Rs.13,781 and Rs.11,050 respectively, appears to demand attention.

Under 'Plantations, Forest Work and Communications,' the charges have been considerably augmented during the last five years :

	1864-65.	1868-69.	Total Outlay during Five years.
	Rs.	Rs.	Rs.
Plantations . . .	284	21,969	34,622
Forest work . . .	298	10,760	16,986
Communications . . .	304	9,097	35,987

Now all these are necessary operations, but it appears to His Excellency in Council that in the matter of plantations certainly the results achieved as detailed in the Reports have not in any way been commensurate with the amounts expended on that account. Doubtless the climatic difficulties are very great, and it is evident that the operations in this respect are still of a tentative and experimental character, the success of which is as yet uncertain. Under these circumstances, it appears advisable to continue such operations on a more limited scale, until improved modes of procedure shall have

been established by experience which will secure satisfactory results with reasonable certainty.

The account given of the Ayree plantation is not encouraging; 25,000 plants are the result of a considerable outlay, of which Rs.7,400 were spent in 1868-9. And yet it is said that this plantation was, from the commencement, in charge of a practical Forester, specially sent for from Scotland for this description of work. The Report of the Gurrakotta plantation is not much more favourable."

It was considered that no decrease was possible in the establishment of the Department. It had been suggested (by Mr. Jacob) that they should give up departmental working in favour of working by contractors, but the Secretary of State strongly deprecated this move, in view of the experience of the past.

The method of management in force in the unreserved or district forests, under which the forests were farmed out in convenient blocks under annual leases, had proved unsuccessful, as it led to much oppression on the part of the lessees whilst it seemed in no way to further the interests of conservancy, but rather encouraged waste. The proposal had been made to allow the agricultural population to collect the produce they required for their daily use—fuel, grass, bamboos or small timber—in the district forest on payment of an annual rate to be settled with each individual cultivator and thus eliminate the middleman. This system was still under consideration, and the Secretary of State expressed a lively interest in the decision to be come to. It was, it appears, the first time this system of providing for the requirements of the local population had been suggested.

A last point of importance referred to in the Governor-General's review was the question of the advisability of demarcating additional reserves in the vicinity of the lines of railway, "It is evident that the produce of such forests must speedily acquire great value as compared with other tracts situated at a distance from the lines. The Conservator's attention should be specially directed to this question, and a special Report should be submitted, explaining whether in the districts of Nimar, Hoshungabad, or other districts through which the line passes, additional reserves might not with advantage be formed in the vicinity of the railway."

In conclusion the Government of India expressed their full

concurrence with the encomiums expressed by the Chief Commissioner on the great work Major Pearson had accomplished in the provinces, an eulogy which the Secretary of State heartily endorsed.

BERAR

The Berar Forests in the Hyderabad Assigned Districts were not under the Government of the Central Provinces at this period. The management of the forests and the first attempt at introducing a proper organisation in 1865-6 was attended with poor results, and the Annual Administration Report submitted, the first to be drawn up, was designated by the Government of India as "meagre." The receipts for the year were mainly derived from seigniorage upon teak and were nearly double the expenditure, being: receipts Rs.21,309, expenditure Rs.10,895, surplus Rs.10,414.

Captain Mackenzie had been appointed to the charge of these forests, and the Secretary of State, commenting upon the meagre Report, wrote (No. 68, dated 16th November, 1866)

"From the account given by Sir George of this Report it is of course impossible to form any presentable estimate of the capabilities of these forests. I trust that better results may be obtained during the present year from Captain Mackenzie's administration."

Progress in the Berar Forests was slow, the Report for the following year showing but little advance on its predecessor, some changes having had to be made in the establishment owing to the death of Mr. Morrison, the Assistant, and the delay in appointing a Deputy Conservator to the charge of the forests in succession to Captain Mackenzie.

The Forest Report for 1868-9 was written by Strettell, who had been transferred to the charge of the Berar Forests from Sind. Jacob was then Officiating Conservator of Forests, Central Provinces and Berar, and forwarded the Report to Government without comment, as he had had no opportunity of making himself acquainted with the forests concerned.

The position to which conservancy had reached in the Berar Forests is exemplified by the review of the Government of India on these two Reports (No. 11, F., dated 7th January, 1870):

"The financial results of forest administration in the Assigned Districts of Berar, as far as they are exhibited in the

been established by experience which will secure satisfactory results with reasonable certainty.

The account given of the Ayree plantation is not encouraging; 25,000 plants are the result of a considerable outlay, of which Rs.7,400 were spent in 1868-9. And yet it is said that this plantation was, from the commencement, in charge of a practical Forester, specially sent for from Scotland for this description of work. The Report of the Gurrakotta plantation is not much more favourable."

It was considered that no decrease was possible in the establishment of the Department. It had been suggested (by Mr. Jacob) that they should give up departmental working in favour of working by contractors, but the Secretary of State strongly deprecated this move, in view of the experience of the past.

The method of management in force in the unreserved or district forests, under which the forests were farmed out in convenient blocks under annual leases, had proved unsuccessful, as it led to much oppression on the part of the lessees whilst it seemed in no way to further the interests of conservancy, but rather encouraged waste. The proposal had been made to allow the agricultural population to collect the produce they required for their daily use—fuel, grass, bamboos or small timber—in the district forest on payment of an annual rate to be settled with each individual cultivator and thus eliminate the middleman. This system was still under consideration, and the Secretary of State expressed a lively interest in the decision to be come to. It was, it appears, the first time this system of providing for the requirements of the local population had been suggested.

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important to His Excellency in Council that these reserves should be in large blocks of compact shape, and with convenient boundary lines.

The large amount of irrecoverable balances due on account of forest revenue from timber, bamboos and grazing dues, Rs.15,600, as reported by Mr. Strettell in para. 13 of his Report, is unsatisfactory. The remarks on this subject by Captain Mackenzie, in para. 26 of his Report for 1867-8, would seem to indicate a faulty system in this respect. The management of the forests in the Assigned Districts has now been entrusted to the officers of the Forest Department, and His Excellency in Council trusts that efficient arrangements will be made to guard against similar losses of revenue in future.

In para. 169 you allude to a visit to Berar by the Inspector-General of Forests in March last. Mr. Brandis has reported that in April, 1869, he submitted to you a Report, with detailed proposals for the management of the Berar Forests, and I am directed to enquire whether any action has been taken regarding the proposals of that Report."

In the above review there is no mention of the remarks which Captain Mackenzie had made on the subject of the continued practice of "dhya" cultivation in the Berar Forests. The Secretary of State, however, commented on them, saying: "Every effort should be made to get rid of this pernicious custom, which keeps the people from civilisation, and renders proper conservancy impossible."

It is curious how much more backward Berar was in matters of Forest Conservancy at this date than the Central Provinces. It required a visit from Brandis to set the forest machinery in working order.

CHAPTER VII

THE PROGRESS OF FOREST CONSERVANCY IN THE PUNJAB, 1865-1870

DR. J. L. STEWART was appointed the first Conservator of Forests in the Punjab in 1864 and, as will be related later, one of the first pieces of work he carried out was a careful enquiry into the fuel supplies required for the Punjab Railway. This matter, it will be remembered, had already received some attention from Cleghorn during his investigations into the state of the Punjab Forests, as already detailed in Volume I. Before considering this question of fuel supplies it will be of interest to glance at what was being done in the Himalaya.

From what has been already said in Vol. I, Ch. XXII, *et. seq.*, on the subject of the Punjab Himalayan forests it will have become apparent that there was a serious danger of the supplies of deodar timber becoming restricted, if not of entirely failing, in a not distant future unless drastic steps were taken to stop the excessive and extensive felling to which these forests were being subjected. Cleghorn had pointed out quite clearly that neither the Chamba State Forests nor those of the Bushahr State could stand fellings on the scale that had been taking place during the past decade. On his own initiative the Rajah of Chamba, in 1864, suggested that the Government of India should lease his forests for a period of years, a suitable scale of payment being made to him for the lease. In their Despatch (Rev. For., No. 2, dated 23rd February, 1865) the Governor-General (Sir John Lawrence) in Council were able to inform the Secretary of State that a lease of these forests had been obtained. This lease provided that the sole control of all the forests in the territory of Chamba should be vested in the British Government for a period of 20 years, renewable on the expiry of that term at the pleasure of the British Government for a further period of 20 years, and so on for 99 years. At the expiry of the last period it would be open to the Rajah

to end the agreement, or enter into a fresh one. The main provision of this lease was that the Punjab Government undertook to pay the Rajah of Chamba an annual sum of Rs.20,000 during the first 20 years of the operation of the lease. This sum was calculated on the supposition that at least 5000 trees per annum would be available for felling, which, at the rates for deodar in force at the time, would cover the amount of the payment. The Punjab Government, however, provided a safeguard to some extent by a clause which allowed one-fourth of this sum of Rs.20,000, or as much of it as might be required within that limit, to be made available for the improvement of the forests and for opening out communications through them.

The Secretary of State (No. 29, dated 8th June, 1865) approved of the action taken.

On the 6th September following the Government of India (F., No. 13) were able to inform the Secretary of State that a lease had been obtained of the Bushahr Forests. In this Despatch they wrote: "On a proposal from the Government of the Punjab, made early in 1863, based on an offer of the Rajah of Bushahr that Government should take over the management of the forests within his territory, and in consideration of the important bearing of the forests in the Sutlej Valley on the supply of timber to the Public Works Department, and especially to the railway in the Punjab, a lease of these Forests for a term of 50 years has been entered into with our sanction.

The system of management to be pursued is generally similar to that approved in your Despatch, No. 29, dated 8th June last, for the Chamba Forests, and we have instructed the Punjab Government to give the Rajah a pledge to that effect as a counter-agreement."

The Bushahr Forests had been carefully examined by Brandis, Stewart and Captain Wood, and a Report and valuation of their timber contents had been made. In the Report some reference was made to the possibility, if considered to be in the interests of the British Government, of working these forests without reference to their future maintenance or reproduction! The demand for timber on the part of Government Departments was, we know, very great at the time; but it is difficult to believe that Brandis could have ever entertained the idea of cutting out the Bushahr Forests to supply this demand.

In any event, the Secretary of State in his Despatch (R., No. 51, dated 30th December, 1865), whilst sanctioning the lease of the forests for a period of 50 years, wrote, on the above subject: "I must observe that even were it expedient, in the interests of the British Government, to work these forests without reference to their maintenance and reproduction, such a course would not be fair towards the Rajah without his full consent and approbation. The proposed re-examination of the deodar localities between Bussahir and the plains, however, seems very desirable, and I shall be glad to learn that it may be found that there are yet left some forests in that region which can be profitably worked."

The question of the supplies of sleepers and fuel for the Punjab railways was receiving anxious attention at this period. The latter will be dealt with later on. As regards the sleeper supplies, both Major Warrand, R.E., Deputy Consulting Engineer, Punjab, and Cleghorn had submitted Reports. The latter's estimates as to the amount of deodar which would be available were at first too optimistic and were somewhat reduced. In a Memorandum dated 4th February, 1865, on these Reports, Brandis discussed the amounts of timber available.

Most of the timber, he considered, would probably be drawn from the forests of Chamba, Bushahr and Tehri Garhwal, from whom leases had been obtained. It was estimated that about 200 tons of timber would be required for the sleepers of each mile of railway; but, under the contract, one-half of the length was to be laid with iron pot sleepers. For the other half, about 30,000 tons of timber would be required during the following four years. There appeared to be no reason to apprehend that by adopting fir (i.e. pine) impregnated with chloride of zinc, there would be any difficulty in meeting the demand. It was calculated that within this period 2,300 tons could be obtained from the forests of the Chenab, Ravi, Beas and Sutlej, independently of the large supplies which might be obtained from those of the Jumna and Ganges. The sets of Burnetizing apparatus (for impregnating the pine sleepers) which had been got out by the Railway Company had been made over to contractors and were to be erected in suitable localities.

The Report on Forest Administration in the Punjab for 1864-5, drawn up by Stewart, gives evidence that considerable progress had already been made in the introduction of

conservancy into the Himalayan Forests, which were the first to receive attention, although the Conservator had travelled extensively in and inspected most of the forest areas in the plains during the year. The Himalayan Forests had been formed into five divisions, bearing the names of the five Punjab rivers.

The general results of the year's operations may be briefly summarised as follows :

" On two of the rivers, the Beas and Sutlej, operations commenced only in 1864; there was consequently no income from these divisions during the year. The expenditure incurred on them amounted to : Beas Division, Rs. 7,337 ; Sutlej Division, Rs. 11,012 ; total, Rs. 18,349.

Work was continued on the Chenab and Ravi Rivers, and the operations on the Jhelum River, which was not then a sanctioned division, are exhibited.

The results of the year's operations are :

(a) Expenditure incurred :	Rs.	Rs.
Chenab	1,30,226	
Ravi	64,085	
Jhelum	15,275	
Total Expenditure	<u> </u>	2,09,586

(b) While the amount of sales effected was :		
Chenab	1,84,348	
Ravi	13,188	
Jhelum	24,063	
Total Sales	<u> </u>	2,21,599
Showing that the sales exceeded expenditure by		12,013

(c) At the same time the estimated value of the timber at the depots has not fallen, the figures being :

Value of timber depots at the end of the year	
1863-64	1,26,996
Ditto, ditto, 1864-65	1,36,104
Showing an increase of the value of timber in hand of	<u> </u> 9,108

(d) Nor is there reason to think that the quantity of timber in the rivers, which has been launched but has not reached the depots, is less than it was at the end of the previous year, for :

The number of new logs launched is stated at	43,170
While the number taken out of the rivers is given at	36,953 only.

FOREST CONSERVANCY IN THE PUNJAB 259

(e) The value of the logs now in the Rivers Chenab and Ravi which have not yet reached the depots is estimated at :

	Rs.
Chenab	4,00,000
Ravi	3,00,000
	7,00,000
Total estimated value . . .	7,00,000

Chenab Division. With reference to the conditions and prospects of these forests the 1863-4 Report stated :

'The trees most conveniently situated with respect to the rivers having been cut first, the cutting is now becoming more distant, and the cost is increased accordingly. At the same time the work is beginning to be done in a more careful and systematic manner than in past years, and arrangements for the future as well as for the present have to be considered in conducting the forest operations. The number of deodar trees felled within the last two or three years has been much greater than these forests should properly be made to yield. So large an amount of timber having been cut and remaining in depot, the cutting can with advantage be slackened, and the attention of the Forest Officers on this river be devoted more to conservancy and planting.'

The Officers of the Forest Department had given due weight to these recommendations. The number of trees felled in 1864-5 was only 5,874 against 13,230 felled in 1863-4, and it was proposed to limit the fellings in 1865-6 to 4,000 trees. The Conservator expressed a hope that before the submission of his next Annual Report (1864-5) he would have the opportunity of visiting, inspecting and valuing most of the forests on this river and on the Ravi, and so be in a position to frame an approximate estimate of the quantity of timber they could furnish annually. This work he had now accomplished and his Report had been drawn up with the necessary maps.

Ravi Division. In their review of Stewart's Report the Government of the Punjab wrote as follows on the subject of the Ravi Forests : ' It was remarked in the Report on the forests of this division for 1863-4, that " The chief difficulty experienced on the Ravi is that noticed in paragraph 16. Whilst different interests are at work, transporting timber by the same river, the deceits and misappropriations referred to are practised and are a cause of loss. It is a fact, that logs of special note, cut by the Forest Officers, carefully examined and measured before being launched, or in course of transit, have been identified on reaching the depot, where they arrived with a new mark of proprietorship substituted for the Government mark."

The leasing of these forests to the British Government, which

was arranged during the last year, will keep rival interests from working on the same river, and consequently remove the difficulty referred to, as soon as private dealers have removed the timber which they still have in this river. A considerable portion of this timber will, however, be purchased under the authority conveyed in Public Works, No. 523 F., of the 20th October last.

The additional Budget provision required by Dr. Stewart to meet increased expenditure in this division on account of the arrangements made for supplying railway sleepers for the Delhi Line, has been sanctioned by Government of India in No. 523 F., above quoted.

It is feared that the forests on this river have been even more exhausted than those on the Chenab. The number of trees felled has been only 1,681, as compared with 4,657 felled in the previous year. It is intended to fell but little deodar during 1865-6, and that for long timber, and for Government use. The cutting will also be confined, if possible, within smaller areas, and the establishments will be mostly employed in launching the logs still in the forest, aiding them in their progress down the river, and in cutting up into railway sleepers those logs which are within reach. All these proposals appear to His Honour the Lieutenant-Governor to be judicious.

Beas Division. The operations on this river were only commenced during the year. The demand for timber from the region was great, but the extent of deodar forests on the river and its tributaries was small, whilst the river itself was said to be the least favourable of all the large Punjab rivers for floating operations. It had not yet been decided, says the Report, 'whether it would be best to speedily fell all the available deodar to meet the present railway demand, or to fell but little at present, reserving the mass of its forests to meet future wants.' In the meantime care was to be taken that no excessive felling took place in 1865-6. A considerable quantity of timber had been put into the river, and it was expected that a fair amount would reach the depot in 1866.

Sutlej Division. Forest work in this division had only been commenced in June, 1864; 370 trees had been felled and converted into 1,748 logs, none of which had been launched. The lease which had been secured of the Bushahr Forests did not effectually exclude from this river all private traders in timber, and it was considered very desirable that this should if possible be done to avoid friction and robbery. Arrangements to this end were therefore being made to secure leases of the forests in the neighbouring State of Suket and of those of the jagheer of the hereditary Wagir of Poari. It was said that the demand for the Sutlej timber was great, and a considerable return was hoped for before May, 1866.

Jhelum Division. A considerable correspondence had taken place between the Punjab Government and the Government of India

on the necessity of conserving the forests on the Nainsukh branch of the Jhelum River in Khagan. The Government of India had approved of the formation of the Jhelum Division (to the charge of which Ribbentrop was subsequently appointed on his arrival in India). During the year in question 810 trees had been felled, yielding 2,600 logs, the whole of which were sold. The expenditure incurred was Rs.15,275 and the income Rs.24,063, giving a profit of Rs.8,788.

Stewart suggested in his Report that the following improvements for the conservancy of the forests were necessary :

- ' (a) Measures to reduce the frequency of jungle fires.
- (b) Careful selection of trees to be felled under the personal supervision of the Forest Officer, with regard to number, position and size.
- (c) The introduction of the saw for cross-cutting.
- (d) Measures to protect timbers being converted into planks by hatchets.
- (e) Branding instead of axe marking, and the use of a distinctive mark each year.
- (f) Formation of proper slides, to prevent waste of timber by breakage on the rough mountain-sides.
- (g) As much supervision as possible of logs launched but which have not yet reached the depots.'

The Punjab Government's review continued :

' The facts stated in the accompanying Report, as well as the entire proceedings of the Forest Department during the past year, show, in His Honour's opinion, very decisively, how urgently the formation of this Department was required, to introduce correct principles of conservancy and cutting, and to preserve the forests of the Himalaya from the ruinous waste to which they have been subject for the past few years. It seems to the Lieutenant-Governor absolutely indispensable, for real efficiency, that the control of those forests situated on or near the great rivers, and the principal affluents, should be placed, as far as they possibly can be, under the exclusive control of the department, and every available opportunity will be taken advantage of, and every endeavour made to secure the transfer to it, of all such forests as may still remain under separate management.'

Dr. Stewart suggests that he might be allowed to make a tour among the forests of the Chenab and Ravi rivers situated within the territory of his Highness the Maharajah of Cashmere. Such a visit will, His Honour thinks, if carried out with the Maharajah's consent, prove very advantageous, as completing our information in regard to the timber resources of the Himalaya. The Agents of

the Railway Contractors are already in communication with the Maharajah with a view to securing a supply of sleepers. Every assistance has been offered them by Dr. Stewart towards carrying on the negotiations, and His Honour trusts there will be little difficulty in satisfying His Highness that the interests of the two Governments in this matter are one, and may best be secured by mutual co-operation.

The accompanying Report is confined chiefly to the supplies of deodar, with casual mention only of the inferior varieties of pine. But the Himalayan Forests also yield ash, maple, walnut and other woods, which may probably be turned to account, and to which it will be well if, in future, some attention be paid.

I am desired, in conclusion, to remark, that this Report has reference only to operations in the Himalaya, other operations being but briefly alluded to in Dr. Stewart's concluding remarks. But I am to state that, so far as that officer himself is concerned, the operations in the Himalaya form a portion only of his labours. In addition to them he has traversed large portions of the Punjab, frequently at most trying seasons of the year, and has undergone an amount of physical labour to which few men could have proved equal. He has largely afforded advice to administrative officers in various parts where it could be of use, and he has supplied a series of most valuable Reports on the 'rukhs' of the Barea Doab, on the Katchi Forest of the Bunnoo District, on the Kalesar Forest and on other subjects, all of which have either been before the Supreme Government, or have appeared in the printed volumes of the proceedings of this Government in the Forest Department. His Honour observes that he has well earned the cordial acknowledgments of Government; the Forest Department is rapidly attaining an excellent organisation under him, and the officers employed in it appear all to have afforded him satisfaction."

Cleghorn was Officiating Inspector-General of Forests at the time, and in view of the knowledge of these forests he possessed his Memorandum on the Report is of some interest. He considered the work carried out during the year to be most favourable. The following remarks are worthy of note, since they afford the first indication of the results which were being obtained in the effort to form deodar plantations:

Deodar Plantations.—"The first attempts at restoring the forests by planting have not been successful. It is stated that the seeds germinated and young plants came up, but they dried up or disappeared. The attempts were generally made upon steep hill-sides where the seedlings may have been washed away. The restoring of forests upon steep declivities is more abhorious and uncertain than upon comparatively level ground:

but it is more important to clothe hill-sides with wood for the conservative influence it exercises in preventing landslips, etc. It might be useful to make small terraces before planting the face of the hill, or better, to put the seeds in a *shallow* trench or ditch."

As Brandis had already shown, the most valuable deodar localities were on the terraces of fields deserted centuries ago. These forests sprang up after cultivation was abandoned, and the trees found nourishment in the comparatively level soil.

"There is much that is worthy of consideration in paragraphs 60 and 61 of Dr. Stewart's Report, where he declares it to be his duty rather to conserve than to plant deodar trees at the present stage of forest management in the Western Himalaya. The true method of securing the largest profit and of replanting the forest, appears to be to fell first-class trees, not exceeding one-third of the whole, in such a way as always to leave convenient spaces for the growth of young trees. The remaining two-thirds may generally be relied upon to replant the vacancies by natural sowing, if cattle are strictly excluded. The seedlings require to be thinned out when too dense, the weak and crooked plants to be weeded out, and any creepers or thorns which choke or overshadow the young conifers. It would be well to know what success has attended the measures which it is stated by the Lieutenant-Governor have been taken to reduce the frequency of jungle fires."

In his Despatch (R., No. 58, dated 17th October, 1866) on the subject of this Report the Secretary of State displayed the liveliest interest in the progress of organisation in the forests of this Province, and endorsed the remark of the Punjab Government anent the urgency of forming the Forest Department in the Province "for the preservation of the forests from absolute destruction."

Some hope, it would appear, had been entertained of securing a lease of a portion of the forests belonging to the Maharajah of Kashmir, since efforts were now being made to obtain such leases of all forests belonging to native rulers which were contiguous to or affected the proper working of forests within the British zone. On this subject the Secretary of State wrote in the Despatch above alluded to: "Dr. Stewart's intended tour of inspection among the forests not under British control, especially those of the Maharajah of Kashmir, will, I doubt not,

be very advantageous, even should he not succeed in obtaining leases of any of the forests not at present under the management of the Forest Department. The evils resulting from the admixture of jurisdiction in neighbouring forests are evident, and I am glad to see that the Forest Officers are awake to the importance of bringing all the forests under one set of rules. It is not impossible that forest holders, without parting with their forests, might be induced to adopt for their own interests the rules of conservancy which have been laid down for the better administration of British forests; although, as Dr. Stewart remarks, we cannot expect that this concentration will be complete, it may, nevertheless, become more perfect than it is now, and every opportunity should be taken to make it so."

In his Report Stewart had also alluded to the necessity of having a sufficient supply of well-qualified officers "if permanency is to be given to the efforts which have been recently made towards establishing Forest Conservancy." Commenting on this remark the Secretary of State noted that Brandis' proposals on this head had already received the approval of the Government of India and himself.

The comfortable feeling of security which the introduction of Forest Conservancy into the Punjab and the acquisition of the leases of their forests from the Chamba and Bushahr Rajahs had induced in the mind of the Punjab Government was rudely disturbed by Reports drawn up by Stewart in 1866 on the resources of the Chenab and Ravi Divisions. It will be remembered that under the lease obtained from the Chamba Rajah the Punjab Government had to pay the former a sum of Rs.20,000 annually during the first twenty years of the operation of the lease. It appeared from Stewart's Reports of his subsequent investigations in these forests that they did not now contain sufficient trees of felling size to cover this annual payment. The Reports are of such importance that it will be necessary to reproduce portions of the Punjab Government's summary of them which was forwarded to the Government of India (Forests, No. 1760, dated Lahore, 19th July, 1866). Many of the remarks contained in this admirable précis by the Lieutenant-Governor (Sir Donald McLeod) applied equally at this period to other parts of India; and displayed the necessity of bringing the organisation of the forests under a more centralised management at this early period in the developing Forest Department.

FOREST CONSERVANCY IN THE PUNJAB 265

Stewart's Report on the Chenab Forests showed that they contained the following estimated number of deodar trees divided into three classes :—

- | | |
|--|---------|
| (1) Number of first-class trees remaining in the forests where felling had been and was still being carried out | = 5,585 |
| (2) Number of trees in forests as yet untouched and to open which expensive slides would have to be made | = 8,900 |
| (3) Number of trees in situations where launching of the timber would be difficult, or the number in any one locality not sufficiently numerous to warrant the construction of safe slides | = 2,505 |

Estimated total deodar trees	= 16,990
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Under the above three categories Stewart estimated that the trees which would be actually available for use, excluding those inaccessible or required to be left for purposes of reproducing the forests, would be: (1) 4000; (2) 7000; (3) 1000; or a total of 12,000 first-class trees in all. This number had already on two previous occasions been exceeded by the fellings of a single year.

For the Ravi Forests Stewart also divided the trees into three categories :—

- | | |
|---|---------|
| (1) Deodar trees in compact forests, unworked, and trees still remaining in worked forests, all accessible to extraction | = 5,900 |
| (2) Trees in inaccessible or difficult situations in forests either previously unworked or already partially worked | = 3,625 |
| (3) Forests where the number of trees was only guessed at mostly from native information; and where the difficulties of extraction were known to be great | = 2,900 |

Estimated total deodar trees	= 12,425
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Under these three classes Stewart estimated the number of trees which would be available for felling at 3000, 2500 and (with present information) 0; the yield of the Ravi Forests

could only be counted at 5500 first-class deodar trees. This gave for the whole of the forests in the Chamba territory an approximate total of 17,500 first-class deodar trees fit for felling!

This exposition of the condition and resources of the Chamba Forests might well have disheartened the Punjab Government and put back the organisation of the forests and the introduction of a scientific conservancy for many years. The blow was, however, met in a most statesmanlike manner. The Lieutenant-Governor summarised the Reports in a Memorandum written by the Secretary.

The Lieutenant-Governor, after commenting upon the great value of Stewarts' Reports, owing to the detailed manner in which he had described the present position of the deodar forests and the financial prospects of the Department as influenced by the Report, stated that the Conservator had established four important factors: (1) Previous to the annexation of the Punjab there was little demand on the deodar forests, such demand as existed being probably supplied by drift timber from the rivers; (2) immediately after the annexation, a demand on the Forests of the Ravi ensued and later on those of the Chenab. These demands had since rapidly increased; (3) that the fellings had been in excess of the capacity of the forests and had been most wastefully carried out; (4) that future fellings in these forests, subject to a payment of Rs.20,000 annually to the Rajah of Chamba, could not prove remunerative at the existing sale prices of deodar, as sufficient trees did not exist; for, if 5000 trees were felled annually to provide the seigniorage due to the Rajah the forests would be cut out within five years. The productive powers of these forests, the Lieutenant-Governor considered, had been greatly exaggerated, since at the time of Longden's visit (I, p. 264) he (the Governor) himself remembered that they were considered inexhaustible. It was now realised, he said, that no forest, however large, subject to a great demand for railways, foundries, etc., could be so regarded unless under proper conservancy.

It was not possible to ascertain the amount of timber which had been cut on the Ravi, but 81,873 trees had been felled on the Chenab. Seventeen thousand trees now only remained, and therefore the Lieutenant-Governor agreed that the Government of India was right (Resol. of 15th September, 1863) in expressing doubts as to the expediency of agreeing to

pay a minimum seigniorage of Rs.20,000 to the Rajah ; but he adds that this was done on the supposition that the trees actually existed in sufficient numbers in the forests. The Lieutenant-Governor did not, however, despair of the position. From enquiries he had instituted he had discovered that the prices paid for timber in the Punjab were unaccountably low as compared with those in other provinces. It had been ascertained that the rate paid in Meerut for rough sâl beams was Rs.2.6 (rupees two and annas six) per cubic foot and for sawn sâl beams Rs.4.4 to Rs.4.8, and in the Fort William (Calcutta) Executive Division rough sâl R.1.12 and sawn sâl Rs.2.8 per cubic foot against a general average for good deodar in the Punjab, increasing in the case of logs under 20 feet in length from about eight annas in 1850 to R.1 per cubic foot in 1866. For lengths 20-30 feet, which were very scarce, 11 annas in 1850 (Lahore) had now risen to Rs.2.8. At Attock the price was R.1 per cubic foot. Beams of fir of these lengths were still quoted at 12 annas per cubic foot, the rate in 1850 being 6½ annas. For shorter lengths the rate was 8 annas. These low prices were due to the fact that under other Governments there had been little demand for timber, and it was obtained at small cost, trees growing on the river banks in the plains being cut, as also mulberry, mango and other species in groves in villages under the former Sikh rulers. The demand arose after the arrival of the British and was created by them. The cost of extraction increased and was now heavy. And yet the prices had shown little rise. The existing demand was not only for the wants of the people, the greater part of the material being required for public works such as railways, cantonments and so forth, both timber and fuel being wanted. For the latter prices had rapidly risen and the same upward trend must follow for constructional timber. The Governor quoted a recent instance of a large firm of railway contractors having paid Mr. Arratoon for the privilege of cutting 8000 deodar trees on the Sutlej at the rate of Rs.11 per tree (the price per tree paid to the Chamba Rajah by Government, after deducting R.1 for conservancy purposes was Rs.3 per tree on the Chenab and Rs.4 on the Ravi for first-class deodar trees). The above firm of contractors had had to pay the enhanced price for the trees owing to the shortness of supplies and the necessity of fulfilling their contract. The Governor held that the demand for deodar was increasing and would continue to do so, and that consequently the price of the timber would

greatly rise. He therefore intimated that in future a certain amount of timber should be set aside for the Public Works Department (to be paid for at current rates) and that the rest be auctioned each year, full notice being given of the sales, and ordered that this system should be introduced at once. Further, that the other timbers of the hills, *Pinus excelsa*, *Cupressus torrulosa*, *Juniperus excelsa*, walnut, maple, ash, yew and others, should be brought down and sold in the same fashion.

In conclusion, the Lieutenant-Governor saw no reason to doubt that under the new methods it would be possible to pay the sum due annually to the Rajah out of current forest revenue. He also pointed out that in any event under the agreement up to one-fourth of the sum was to be held available for the improvement of the forests and opening out communications, both objects of high utility to the State of Chamba. That this amount should accordingly be annually spent on these works.

The Secretary's Memorandum on the Lieutenant-Governor's policy concluded as follows :

" His Honour thinks it impossible to read the accompanying Reports without perceiving what important and difficult problems are involved in the management of forests, and how little hope there is of this management being really successful, unless conducted by skilled persons more or less trained and accustomed to this special duty. This remark applies to the 'rukhs' and plantations of the plains equally with the forests of the hills, and it may be hoped that it will hereafter be found possible to utilise to some extent in the former, during the cold season, the establishment employed in the latter during the hot weather and the rains.

Next to the arrangements necessary for, and principles to be observed in, the felling and bringing down the timber, there can, His Honour observes, be no doubt that the matter most urgently requiring the careful attention of the Forest Officers is the carrying out of planting on a large scale. The experiments heretofore made have, for the most part, as shown by Dr. Stewart, been productive of but very inadequate results. One trial, however, made some years ago at Dhurm-salla, has succeeded admirably, and there can, His Honour thinks, be no reasonable doubt that yet greater and more unfailing success will be ensured when the best mode of conducting these operations shall have been fully determined ;

while the ultimate gain to future generations, from forming large forests in those parts only which are most favourable to the growth of good timber, and most accessible, will be incalculable. . . ."

In a Circular (No. 4, Forests, dated 21st February, 1867) the Government of India, in reviewing the Punjab Government's Memorandum, approved of the conclusions arrived at by the Lieutenant-Governor of the Punjab. They stated that "it may be supposed that in the deep lateral ravines there are a number of trees which have escaped observation, but these are difficult of access, and ought not to be included in the estimate"; and added, "the Governor-General in Council . . . desires that the Local Government will watch with vigilance lest the evils resulting from excessive felling occur also in the Sutlej, Beas and Jhelum Divisions."

The Secretary of State (R.F., No. 17, dated 31st May, 1867) was not unprepared for these disclosures on the subject of the resources of the Chamba Forests and, whilst giving his cordial approval to the Lieutenant-Governor's conclusions, wrote :

"The correspondence of my predecessors with Your Excellency in Council last year had prepared me, in a great degree, for the information that these forests had become nearly exhausted by reckless felling, in anticipation of the resources of future years, and the papers now before me confirm the apprehensions which were then entertained. The able Reports of the Conservator, and the judicious and practical observations on them by the Lieutenant-Governor of the Punjab, show that the question has been taken up in a right spirit, and is in good hands for the future. In the assumption that remuneration for current expenditure is not by any means the chief point to be looked to in Forest Conservancy, Dr. Stewart is only reiterating an opinion which has been constantly expressed in the Despatches of my predecessors in office, and in which I heartily concur; although, at the same time, I agree with them that there are few cases in which conservancy is enforced on sound principles, with the view to reproduction and husbanding the supply of timber and fuel for future generations, in which it may not in time be made at least self-supporting.

The directions to the Lieutenant-Governor, to watch with vigilance that the evils of excessive felling may not occur in

the other forests under his control, and the circulation of his letter as a warning to the Local Governments of the importance of proper valuation surveys in forests, have also my entire approbation."

The introduction of some measure of Forest Conservancy into distant Lahul was receiving consideration at this period. It will be remembered that Cleghorn crossed the Rotang Pass from Lahul in August, 1862 (Vol. I, p. 417), and remarked that Lahul was treeless: "In the valley of Chandra for five or six miles there is not a bush to be seen." But this want of vegetation did not apply to the whole area. Mr. T. D. Forsyth, C.B., Commissioner and Superintendent, Jullundur, had had the matter under consideration and addressed a Memorandum (dated 23rd July, 1866) on the subject to the Punjab Government, in which he enumerated some Forest Rules which he suggested should be introduced into Lahul. The position will be appreciated by the following extracts from the Memorandum:

"The valley of Chandra is much more sterile than the valley of the Bhaga. From Koksar to the confluence of the two streams there is scarcely a timber tree to be seen; small birch trees, willows and a few pines are to be found. The zemindars are obliged to use birch for their beams; and at Koksar they bring 'keeloo' timber over the pass from Rala. Willows are found at Seesoo and Gondla, planted by the zemindars, who use the branches for fodder in the winter. Crops are scanty, and many plateaux which look fit for cultivation are left barren for want of water.

It is far different in the Bhaga Valley. Here vegetation is more abundant, and crops look excellent. The hill-sides are covered with flowers of every description. Large bushes of sweetbriar and dog-rose are to be seen everywhere; gooseberry bushes abound near Kielung. Rhubarb grows on the mountain-side near Darcha and Putseo; wheat and barley and buckwheat are grown in the fields. Potatoes and all kinds of vegetables are cultivated by the Moravian missionaries at Kielung, and apple and apricot trees have been imported from Ladak. The zemindars have lately taken to cultivate potatoes.

In the Goomrung Kotee, around Kielung, and at Koolung, are sparse forests of the pencil cedar. The tree does not attain any great bulk, and, owing to the difficulty in sawing up the timber (I doubt if there is a saw in all Lahoul), the zemindars cut down young trees for domestic purposes. The dry wood is used for fuel, and too often green timber is used for this purpose.

The circumstances of Lahul are peculiar. The people are dependent for a supply of timber and fuel on the wood in the vicinity of their houses. They cannot go far for it in winter, and at all times it would be difficult to carry beams of any size to a distance; where, therefore, birch trees are found near, that wood is

used for fuel, and sometimes for house-building ; where only deodar trees are to be had, the people use it for burning. At Kielung, if the people were forbidden to use cedar for this purpose, they would have to go without it altogether.

But it is very necessary to put a stop to waste and unauthorised cutting and, after consulting with Mr. Heyde and Tara Chund, I have framed the following few rules :

LAHUL FOREST RULES

- I. No deodar tree in Lahul is to be cut down without the permission of the Negee.
- II. On application being made by a zemindar for deodar timber, the Negee will send the Forest Ranger to mark the tree, after which the zemindar may fell it.
- III. No tree of less than 3 feet in girth shall be felled.
- IV. The Negee shall exercise his discretion in granting the quantity of timber applied for, and is to assure himself that no more than what is absolutely required for the purpose specified is taken.
- V. No payment shall be taken from zemindars or inhabitants of Lahul for timber.
- VI. Dry deodar wood may be taken for fuel without application.
- VII. With the assistance of the Rev. Mr. Hyde, or other member of the mission at Kielung, the Forest Ranger shall mark off such deodar trees as, being crooked or otherwise unfit for timber, may be used as firewood, and these trees may be felled for firewood with the permission of the Negee.
- VIII. Any person cutting deodar wood without permission will be liable to a fine of Rs.30 for each offence.
- IX. Portions of waste land shall be set apart for planting 'keloo' and deodar trees, *Cedrus deodara* and *Juniperus excelsa*. These plantations will be under the control of the Moravian missionaries ; and the Negee is held responsible that cattle are not allowed to trespass, or that any injury is done to these plantations."

Commenting upon this Memorandum the Secretary to the Financial Commissioner, Punjab, wrote: "The Forest Rules proposed by the Commissioner for Lahul appear to be suitable. It would be well, however, if once a year a list were furnished showing to whom, and in what quantity, timber was granted by the Negee under Rule IV ; and also if some slight payment were demanded from individuals who received 10 trees or more. The gratuitous grant of timber is calculated to encourage wasteful expenditure. The Commissioner of Jullundur doubts if there is a

saw in all Lahul ; it would tend to economise timber if efforts were made to introduce saws, and to familiarise the people with their use."

In the Proceedings of the Punjab Government for January, 1867, the Lieutenant-Governor deprecated making use of the missionaries, and continued :

" By the term ' deodar ' Mr. Forsyth appears to mean the pencil cedar, or *Juniperus excelsa*, which, however, it is believed, is nowhere known by that name ; and no mention is made by him of the *Pinus excelsa*, which grows in that region, and is a tree only inferior in value to the *Cedrus deodara*. He appears also to have somewhat misunderstood the meaning of the Conservator's proposals, if he supposes him to have intended that the inhabitants of Lahul should be debarred from the use of the *Juniperus* or other trees for fuel without payment of fees.

In other respects the remarks made, and rules proposed by Mr. Forsyth, appear to the Lieutenant-Governor to be appropriate, with, however, one very important exception, viz., that he has omitted all reference to the demarcation and special conservation of the best forests, and the sources from whence outlay required for purposes of conservancy are to be defrayed. It accordingly appears necessary to His Honour that Mr. Forsyth reconsider these points, and, in communication, not with this office, but with the officers of the Forest Department, devise such further arrangements as may be suitable for securing these ends."

In the Lieutenant-Governor's review on the Forest Administration Report for 1865-6 the outcome of the Chenab and Ravi disclosures is seen. After referring to the estimates and figures relating to the deodar trees available for felling, the Review continues :

" The following measures appear to the Lieutenant-Governor to be imperatively necessary :

(1) Greatly to reduce the number of deodar trees to be felled annually—in fact, to reduce it to about 2000, or one-third of the number felled last year.

(2) To proceed vigorously with the planting out of young trees on carefully selected sites.

(3) To fell the *Pinus excelsa*, which is abundant on these rivers, in some quantity to supply the place of deodar in the market.

(4) To raise considerably the price of deodar timber at the depots.

These are all points which have for some time forced

themselves on His Honour's attention, and orders regarding them will now be issued to the Conservator.

The effect of the first measure will not at once be felt in the market, as there are a large number of deodar logs now in all the rivers to meet immediate requirements. Dr. Stewart will be instructed to carry it out.

The second is now seriously engaging the Conservator's attention, and a considerable number of young trees will be planted out this year. The views of the Lieutenant-Governor on this subject have already been placed before the Government of India, in this office letter, No. 1760, already referred to, and much advantage is expected from the services of the Forest Officer from Europe, trained and educated especially for forest work, for whom the Government of India has recently applied to the Secretary of State."

Ribbentrop was the officer subsequently appointed to this post.

"Arrangements have already been made in regard to the felling of *Pinus excelsa*. The measure is to a certain extent experimental, and will need to be cautiously carried out.

In regard to the fourth measure, it is now abundantly clear that the prices hitherto charged for deodar at the depots are quite inadequate to cover the seigniorage payments made to the Chamba Rajah, and to the Chief of Rampur and Bushahr, the working expenses, and the cost of planting out for reproduction. Some steps in this direction have already been taken. The old system of selling at fixed prices has been discontinued, and sales by private bargain and auction at upset prices have been introduced. The subject will be pressed on the Conservator, and definite rules will be laid down.

Any great reduction in establishment consequent on the restriction which will be placed upon the felling of deodar is scarcely to be anticipated, partly because the *Pinus excelsa* will be felled in lieu to some extent, and partly because planting out for reproduction will be pressed on more vigorously, and increased attention will be devoted to the conservancy of both trees and timber; but all reductions that can be made will be carried into effect.

Every endeavour will thus be made to make the realisations from sales cover the outlay that must necessarily be incurred; but seeing, as is now clearly evident, how much these forests were exhausted before the formation of the Forest

Department, His Honour fears that this result can hardly be attained.

The Beas is the only river the deodar forests of which are in British territory, and it is the only river on which these forests have not yet been made over to the Forest Department.

The transfer of these forests was ordered in this office, No. 4818, of the 23rd February, 1866. This order has since been repeated, and will, it is hoped, be carried out at the end of the rainy season."

A point of curious interest which came up for consideration was the subject of the ownership of windfall trees in the forests leased from the Rajahs. Considerable windfalls had been experienced both on the Ravi and Chenab and on the Sutlej. The Department had taken over the trees in the former areas, but in the latter the Rajah was supposed to have sold 1500 windfall trees to a private dealer. The Governor-General very naturally considered that all windfall trees should be taken over by the Department, and stated that Clauses 1 and 2 in the Bushahr lease and 1 and 4 in the Chamba lease seemed to provide for this. He asked, however, that the point should be determined.

The same trouble over drift timber which had previously occurred in Chamba was being experienced on the Sutlej. Arratoon had obtained the lease for the year, but the Governor-General expressed the opinion that even at the existing high rates it would be better for the Department to secure it in future "in order to throw timber pirates out of employ."

The "accounts" portion of these early Administration Reports was usually the subject of adverse comment in the reviews both by the Local Administrations, by the Inspector-General of Forests and by the Government of India. The newly organised clerical staffs of the Conservators' offices and those out in the districts appear to have had only a rudimentary knowledge of their duties, whilst the Forest Officers themselves for the most part could have had but little previous training in account keeping. In this Report the Governor-General complains of the very large outstandings at the end of the year—even larger than during the previous year. He suggests that a "great improvement would be to compel payment on delivery of timber. . . . Dr. Stewart remarks that it seems doubtful whether, with the kind of dealers there are in the Punjab, it will ever be possible to attain to payment on delivery.

I suggest that measures be taken so as gradually to introduce this practice." It becomes obvious that bad debts must have been somewhat numerous in those early days of the Department.

This matter was again taken up by the Government of India in their review of the Annual Report for the following year (1866-7). In this case the discrepancies between the Budget figures and those in the Report were gone into in considerable detail, the Government of India resolution concluding with the remark that "the system of forest accounts in the Punjab is not yet upon a satisfactory footing." When, however, we reflect upon the arduous nature of the exploration work in a difficult mountainous country upon which the Conservator and his Assistants were employed and realise that they must have spent the greater part of the year on tour in the forests, it is not perhaps surprising that the "accounts" part of their office work was not all that could be desired. But the practice which had grown up in the Punjab of allowing Contractors to remove timber from the forests or depots before paying for it was indefensible.

The chief remarks of both the Government of India and the Secretary of State upon this Report were insistence on the necessity of properly demarcating the forests which were being formed into reserves under the Forest Department, and the equally important point of securing the reproduction of the forests not only by natural means, but also by extensive planting in suitable localities and under a specially qualified officer.

There are, however, points of interest in this Annual Report which indicate the lines upon which progress was proceeding which merit notice.

An anomaly, which indicated how the position of the Himalayan deodar forests had dominated the forestry question at this period, was that the Report, as had its predecessors, only dealt with the hill forests, omitting all reference to those in the plains and the important "rukhs" fuel reserve matter. The Government of India had objected to the non-inclusion of the plains forests, but the objection had not arrived in time to enable the Report to be amended in this respect. At the period it was not of much consequence, as Stewart had reported separately in detail on the whole of this difficult fuel question in the plains, a Report which will be subsequently dealt with.

The demarcation of the forests in the hills was proceeding

slowly, owing in some cases to the forests not having been yet made over to the Department or only recently. Some progress had been made in Kangra with this work, but all the forests in this district had not yet been made over to the Department. The Hoshiarpur Forests had been transferred but not yet demarcated, the Conservator having drawn up a valuable Report on these forests during the year. The Jhelum Division had been formed during the year, but the forests had not yet been transferred to the Department. The Governor-General, in insisting on the importance of the demarcation in order to separate the lands placed under the Forest Department, added that it was "desirable to consider whether a similar demarcation of the more valuable tracts could not be carried out in the forests leased from native princes." The next remark was not, however, equally felicitous. "If the Forest Department could thus obtain complete control over well-defined areas of the best forests, the remainder might be given up to the inhabitants for grazing, and to provide fuel and wood for building and agricultural purposes." Areas subjected to such unrestricted use would, as had been shown so often in the past, soon degenerate into bare waste tracts, useless for any purpose.

The number of deodar felled during the year was 4000 trees in the Chenab Division, 18 in the Ravi, 792 in the Beas, 250 in the Sutlej and none in the Jhelum Divisions. It was stated that it was not found possible to stop the arrangements already made for felling 3000 trees in the Chenab Division, and that owing to a mistake 4000 were cut instead of 3000. It would have been of interest to know exactly who was responsible for the "mistake." Interested Contractors have a way of making such mistakes. However, only 1000 trees were prescribed to be felled during the following year.

On the subject of the excess fellings of deodar which had taken place on the Chenab the forestry experience of Brandis, with his knowledge of Working Plans (as yet of course unknown in India), is seen in the Governor-General in Council's stern reminder: "It is regretted that the number fixed by the Conservator for the Chenab River was exceeded by the officer in charge. I am directed to repeat the injunction conveyed in the review of the Report for 1865-6, that, after the annual yield of a forest district has once been determined, it must not be exceeded without special sanction." It had taken half a century to learn this lesson, but it had been learnt.

Planting operations had been pushed on vigorously, either by lifting young plants from the forests and transferring them elsewhere, or by means of plants grown in nurseries. The operations had met with varying and partial success, but from the results secured His Honour considered "that there is a reasonable prospect of success being attained. There is, in his opinion, hardly any point of greater importance than this in regard to the future interests of the Forest Department." Stewart had pointed out that fencing would be necessary to prevent damage by cattle and sheep during the early years of the plantations. The question as to the nature of the fencing which could be given had yet to be determined.

Mr. Murray, in the Beas Division, had been carrying on observations as to the occurrence of seed on deodar trees, and had arrived at conclusions "on the nearly regular triennial scarcity of this seed. The reported periodical failure," remarked the Lieutenant-Governor, "more or less complete, of the deodar forests to yield seed, is a matter which the Forest Officers will be directed carefully to watch and report upon: the correct ascertainment of it is a matter of great interest and importance. But of still greater practical importance, His Honour observes, is the determination of the mode in which artificial forests of this tree may be most effectively created, as, however desirable and necessary it may be to encourage spontaneous production in those forests which are most favourably situated, it is obvious that the gain will be immense hereafter, if we can succeed in raising fresh forests in those localities best adapted, from their character and position with reference to the great rivers, to meet our wants. And the Conservator of Forests will be requested to see that every possible attention is given to this matter, and every measure tried which may from time to time appear likely to succeed."

Larch seed was also being experimented with, and the Conservator reported its failure in all the divisions in which it had been tried. "It is feared," said the review, "that the sowings of the last consignment have been but little more successful. So far as experiment has yet shown, the tree does not appear to suit the Himalaya, where plants that have sprung up hopefully have in many instances speedily died away. This, however, may possibly have arisen from the mode of treatment not yet being understood."

On this planting question the Governor-General's review had some interesting remarks. Dealing with the exclusion of

grazing from the young plantations and referring to the necessity of demarcating the forests, he said: "Unless a measure of this kind is carried out it is difficult to see how it will be possible to exclude grazing in those parts of the forest where young deodar is springing up. The luxuriant growth of young deodar around the station of Simla appears to His Excellency in Council to afford proof of the vigorous natural reproduction of that tree, if the growth of self-sown seedlings is protected from cattle and other injury." Natural reproduction might, the Governor-General considered, be aided and supplemented by cultivation, where circumstances of soil and climate were less favourable; "but this is not practicable when the Department has not sufficient control of the forests to close from time to time such portions against cattle and other injury as may be needful for the purpose of renewal." After noting with approval the experimental sowing and planting of deodar which was being undertaken and the Lieutenant-Governor's proposal to proceed vigorously with this work, the Governor-General proceeded to give some excellent advice on the matter, advice which would seem to have been founded on a personal practical knowledge of the subject. He wrote:

"Hitherto the experiments have been made in one direction only by transplanting seedlings, either raised in nurseries or taken from the forests.

In the orders on the previous year's Report, experiments by sowing instead of transplanting were advisedly recommended by the Government of India, because long experience in Europe has shown this mode of cultivation to be well suited to certain kinds of coniferous trees.

His Excellency the Governor-General in Council is of opinion that the time has now come when the propriety of undertaking these important operations on a large scale may be considered. His Honour justly remarks that the gain will be immense hereafter, if we can succeed in raising fresh forests in those localities best adapted from their character and position, with reference to the great rivers, to meet the wants of the country.

Should it not be found practicable to demarcate the best forests in Chamba and Bushahr, so as to secure their reproduction, these leased forests will, to a great extent, lose their importance when the present stock of timber shall have been exhausted. For a few acres of fenced-in plantations here and there will obviously be inadequate; whole mountain-sides must

be renewed, and here fencing will, as a rule, be as impracticable in the Himalaya as it is in the State and private forests of the continent of Europe. .

What appears to be required would be to select a suitable locality within British territory, and to take up a sufficient area of waste land or of forest over which the Forest Department should have complete control. A separate forest division should be formed under a specially qualified officer, with the special object of forming new deodar forests by cultivation. To make supervision more efficient, and to diminish its cost, the blocks to be taken up should not be less than four or five square miles, if possible. The principal points to be looked to in the selection of this land would be facility of export for the timber and other produce to be raised, the cost of labour, and the opportunities for obtaining it; finally, good soil, and other conditions favourable for the growth of deodar. Among these the rate of growth should receive due consideration, for it evidently makes a great difference in the out-turn whether a certain crop of timber per acre is raised within a period of eighty years or within twice that time. In Dr. Stewart's last Report on the Khagan Forests, and in the Report on the Bushahr Forests of 1864, it has been shown that the rate of growth is more rapid in the eastern forests than further to the north-west; and again, that in the outer ranges a quicker growth is observed than higher up the valleys near and beyond the first snowy range.

This would indicate the vicinity of the Sutlej or Beas, in Kulu or Kangra, as a suitable site for these operations, and I am directed to state that, on submission of a well-considered plan, His Excellency in Council will be prepared to take into consideration proposals for any establishments which may be required. It appears essential that these operations should be made the sole business of one officer, who should be placed in charge of the work, without any other important calls upon his time and attention.

Should His Honour desire it, the Inspector-General of Forests might be directed, in conjunction with Dr. Stewart, to concert the mode of action likely to secure satisfactory results."

This clearly enunciated pronouncement the trained Forester will recognise as true forestry as distinguished from arboriculture.

Proposals had already been made to fell blue pine (*P. excelsa*)

trees in the Chenab Division, and this proposal was alluded to by the Punjab Government in their review. It was hoped that this tree would receive in the future more attention than it had hitherto.

"The experience of Murree, where the *Pinus excelsa* is extensively used for timbering (I, p. 459), appears to His Honour to show conclusively what a valuable wood it is. He considers that it is alone owing to the reckless abundance with which deodar has been heretofore thrown on the market, that the other has not been adequately appreciated. It will now be brought more prominently to notice. The *Picea morinda* and *Abies Pindrow* may also be introduced, as both are good for cabinet purposes, doors, flooring, etc. The latter also makes very good shingles for roofs, and seems to last well."

The price of deodar had been considerably raised, as had been foreshadowed in the review on the previous year's Report. An agitation had been started to bring about a reduction in the new prices, but the Lieutenant-Governor considered that it would be "highly impolitic again to reduce the rates with the increase of demand resulting from the extension of railways and engineering works generally, and the diminished supply owing to the exhausted state of the forests; it appears to His Honour probable that even higher prices than those now demanded must yet be given for deodar."

Efforts were being made to introduce other species, and a quantity of ash, maple and elm timber from the Chenab Forests was made over to the Ordnance Department for arsenal purposes, a Report being asked for as to their fitness. It was also proposed to float broad-leaved species, such as elm, ash, walnut, maple and horse-chestnut, down the Sutlej from the forests of that division.

Complications had been experienced since the development of the timber industry in settling the boundary between British and Jammu territory. It was hoped that this matter would shortly be settled with the Maharajah of Kashmir's agent.

The arrangements for a lease of the Poari Forests, already alluded to, had been settled and the lease obtained.

The Hoshiarpur Forests were considered to have a future before them, and the Conservator was giving them some attention. It was said that the "tun" tree (*Cedrela Toona*) had formerly grown in these forests to a great size, the wood yielded by the trees being of a very superior quality; but this

tree, with others of a highly useful character, such as the "sissoo," the "champa" (*Michelia Champaca*) and the "kikur" (*Acacia arabica*) had, it was feared, almost entirely disappeared, owing to constant felling and hacking in the former forests, without any attempts having been made to encourage reproduction. The same remark applied to the *Pinus longifolia* of the lower hills, of which large quantities were annually converted into charcoal, an article which, it was held, might probably be yielded of as good quality by trees less useful for timber.

The question of the Department securing the lease of the drift wood was unsettled. The Contractor, Arratoon, had claimed all the drift wood and snowfall timber on the Sutlej River; this claim was not upheld, and the Department were ordered to secure the complete control over all timber coming from the leased forests and, as far as practicable, over the rivers which served as the lines of export.

The remarks of the Governor-General in Council on the subject of the accounts have been alluded to above. The system of selling timber at the time in force in the Punjab was unlike that in other provinces and was obviously unsound, as the following extracts from the Governor-General's review will exemplify:

"In the orders on the Report of 1865-6 it was remarked that the outstandings on account of sales were still very high. In the Statements appended to the present Report, the amount of outstandings on account of the Ravi Division is not given; on account of the Chenab timber they have increased from Rs.96,417 on 1st May, 1866, to Rs.1,05,700 on 1st April, 1867. The Conservator explains that this increase is only apparent, that several items, amounting in the aggregate to Rs.41,200, were paid before 1st May, 1867, and that in reality the outstandings at the close of the year were in a more satisfactory condition than they had been for years. He acknowledges, however, that there is still room for considerable improvement. Of this, His Excellency in Council observes, there can be no doubt, and it seems necessary to insist on the adoption of the system, recommended in the orders on the previous year's Report, to deliver no timber before payment is made.

Of the outstandings at the close of the year Rs.58,722 are stated to belong to previous years. This leaves Rs.46,278 for 1866-7.

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Governor-General in Council addressed a communication to the Secretary of State on this subject. They wrote :

" In March, 1864, the Financial Commissioner of the Punjab called the special attention of all District Officers to the subject, in view to more decided action in the matter, with reference not only to the increasing demand for timber for building purposes, railway sleepers, workshops and such-like, but especially to the demand for fuel to supply the railways. The absolute necessity for early and sustained action was enforced by the observed effects of the railway on the forests near Lahore, of which a very large area had already been cleared to meet the requirements of a railway but 32 miles in length and running two trains only daily. It has been alleged that since the opening of this short line the price of fuel has doubled, and there is no reason to doubt that at Lahore, as also at Mooltan, where the demand for fuel for the Indus steamers is considerable, this has been nearly, if not quite, the case within the last ten years. The Financial Commissioner's Circular was, under our orders, communicated to the several local governments and administrations, with the suggestion that the general object in view might further be assisted if a limited area of land was allowed to be planted with approved sorts of trees in every village, free of assessment, provided that, when first planted, such land was waste and not paying revenue.

As regards fuel, the importance of the issue will be best understood by a consideration of the following particulars. It is calculated, on the supposition that four trains run each way daily, that the consumption of wood-fuel per annum per mile would be 3650 'maunds'—27 maunds=1 ton=45 cubic feet. The trees suitable for fuel come to maturity in from 10 to 17 years, according as they are grown on irrigated land or otherwise, and from this, and the quantity of wood obtainable from an acre of plantation, all who have considered the subject agree in thinking that each mile of railway will require at least 20 acres of plantation for its supply.

Again, according to the calculations of the Railway Engineers, corrected by the Government Officers, dry fuel may be grown on plantations at the rate of Rs.23.4 per 100 maunds, or, say, 4 maunds for the rupee. The lowest prevailing rate on or near the line now under construction would appear to be three maunds for the rupee, and there can be no doubt that the demand of the Railway, unless special measures be taken for its supply, will not only cause an enhancement of this rate, but would bring about the complete denudation of the country. For the difference between these rates, wood may be conveyed 25 miles by common road, which, therefore, is the limiting distance from the line at which plantations should be formed, if wood cannot be grown at less cost.

Further, for the present at least, the supply of fuel must be

considered without reference to the possible use of coal from the fields in Central India or Bengal. Three maunds of dry wood (costing in this case 12 annas) are equivalent to one maund of Indian coal, and coal can be raised at the pits at 3 annas a maund. There remain consequently 9 annas to cover the cost of transport to the point of consumption. As the nearest coalfields (the Kurhurballee and Nerbuda) likely to be worked when the Delhi line is opened are on the lines of other railway companies, the cost of carriage cannot, on the experience gained on the East India Railway, and with special rates, allowing a profit of 50 per cent, be assumed at less than two-thirds per ton, or one-fifth of a pie per maund per mile. Thus the greatest distance over which coal to displace wood at 4 annas a maund can be brought is 540 miles; but the Nerbuda fields are 700 miles, and the Kurhurballee fields 775 miles from Ghazeabad, the nearest point of the Delhi Railway. Coal is therefore, on the foregoing suppositions, out of the question, and if wood be obtainable at a lower price, Rs.12 per 100 maunds, as would appear probable, still more so. The Agent, East Indian Railway Company, it may be added, calculates roughly that he will be able to place coal at Delhi at a cost of Rs.21 per ton, or Rs.75 per 100 maunds. At this rate it is evident that wood will not be displaced till it exceeds Rs.25 per 100 maunds in cost.

Thus, wood-fuel must be arranged for, and the locality in which it should be grown, when considered in connection with the nature of the land to be taken up for plantations, is also limited. For the cost of carriage by land being about 300 maunds, 1 mile per one rupee it would appear, accepting the assumptions of the Deputy Consulting Engineer, Punjab, that the most expensive land that could be taken up for plantations would not involve, when the trees came to maturity, a higher yearly charge for rent and interest than Rs.9½ per acre, also that each acre might produce 365 maunds yearly, that the cost of transport over eight miles would just cover the rent of the land, so that it would be cheaper to have a plantation on first-class land in the immediate vicinity of the railway than on rent-free land more than eight miles distant. The result of an experiment on the Baree Doab Canal shows that about twelve times the above weight may be conveyed by water against stream for R.1, so that the limiting distance is thus increased 96 miles. These particulars have an important bearing on proposals to draw supplies from existing forests on the lower ranges of the hills, and from canal plantations where waste or inferior land may be available for plantations."

As has been already shown (I, p. 491) the question of fuel for the railways in the Punjab first came under the consideration of the Government of India in June, 1863, in connection with the management of the brushwood and grass reserves

(rukhs), and the attention of the Government of the N.W. Provinces was at the same time drawn to the question in connection with the railway in those provinces. Towards the end of that year the necessity of forming plantations to meet the special requirements of the railway was urged by Major Warrant, Deputy Consulting Engineer, Punjab, and early in 1864 the Railway Company's officers took the matter up. The suggestions of the latter were considered by Cleghorn, Stewart and by the Financial Commissioner and the Lieutenant-Governor. Subsequently Stewart drew up a very full Report, in September, 1864, on the supply of fuel for the Punjab Railway between Amritsar and Multan and for the Indus steamers. Dr. Stewart's Report was considered by the Punjab Government, together with the views of some of the Canal and Civil Officers and the Financial Commissioner. Referring to these several Reports and the action taken on them, the Governor-General's Despatch continues :

" The general conclusions are, that the different sources on which the supply must depend are : (1) The outer ranges of the Himalaya and the Siwaliks. (2) Canal plantations. (3) Railway plantations. (4) The rukhs (preserves).

The first of these must be resorted to until artificial plantations have been formed, and have come to maturity, the supply being arranged for in both the Punjab and North-Western Provinces, through either the Forest Department or District Officers, as may be found most suitable. It would seem that fuel may be delivered from the Eastern Siwaliks at various points on the line of the Delhi Railway lying to their south at Rs.12 per 100 maunds. But it is calculated that from the Punjab Siwaliks it will not be possible to deliver fuel at a cheaper rate than Rs.25 per 100 maunds on the line of railway, the wood being taken from the jungles within seven miles of the river, and the quantity of fuel to be got from this source appears to be insufficient to furnish a large, continuous and permanent supply for the railway.

The second source must be created or further developed by the Canal Officers, with the advice and co-operation generally of the Forest Department, much has already been done in the way of sowing on the Baree Doab Canal, and steps have been initiated on other canals.

This source of supply was contemplated from the first, for shortly after the annexation of the Punjab, Lieutenant-Colonel (now Sir Robert) Napier wrote as follows, in a Report on the Baree Doab Canal Project of 1850 :

'The execution of the canal will afford a most favourable opportunity to aid in accomplishing the desire of the most Noble

the Governor-General to increase the cultivation of trees in the Punjab,' and he estimates that no less than 12,696 acres might be planted along the canal and its branches, besides 5000 acres in 50 detached plantations.

The Government of India and the Court of Directors approved of plantations being thus formed, but though much has been done the intention has not been carried out for want of funds, and no separate plantations whatever have been formed; in July last year, when the importance of the subject was fully realised in the Punjab, orders were issued to sow as much land as possible on the canal banks so as to save the season, and the result of very great exertions on the part of the Executive Officers was that, along 144 miles of canal, both banks were sown with *keekur* seed over an area of 2760 acres.'

We may here remark that the expediency of placing the Canal plantations of both the North-Western Provinces and Punjab under the general supervision of the Forest Department has been under our consideration, and we are now in possession of Reports from both those Governments in favour of the measure; the Punjab Government has, in fact, already carried out the arrangement, and the North-Western Government has ordered it from the 1st May, 1866."

In their Despatch, No. 218, dated 12th March, 1870, the Government of India informed the Secretary of State that they had ordered the retransfer of the Canal plantations to the Irrigation Department, at the suggestion of Brandis, on the ground that the Forest Officers could not, except at a great sacrifice of time, which they could ill spare from their own duties, practically supervise such plantations. The Despatch now being dealt with continued:

"The third source of supply is from plantations on the line of railway; these, it is obvious, should be made as near fuelling stations as practicable, as not only likely to be economical both in management and carriage, but as saving the railway from an unremunerative traffic.

Of these three sources, the first will also be available permanently, as well as in the outset, reducing in consequence the area of plantation to be formed, whether on canals or the railway; but it is obvious from what is stated of the expense of carriage above, that those tracts in the hills can only be drawn from which are conveniently situated for the water carriage either of the canals or large rivers.

It has accordingly been proposed—and, apparently, judiciously—that, for the Delhi Railway, between Amritsar and Loodiana, the supply shall be drawn chiefly from the Baree Doab Canal Plantations; one other plantation only, of 600 acres, being formed

by the Forest Department, near Jullundur, in the Saraugwal Bir, already the property of Government, and other supplies being brought down the large rivers crossed by the line in this section, so far as this can be economically done. For the section onwards, from Loodiana to Umballa, plantations will be formed on the line of railway, at the cost of the Company, if not objected to; and for the remainder, from Umballa to Delhi, the supply will be drawn from the Siwaliks, and the plantations existing and to be increased on the Ganges, the Eastern and the Western Jumna Canals, depots being formed at the five points where the railway crosses these canals.

The fourth source is the rukhs. These are adjacent to the line of the Punjab Railway between Amritsar, Lahore and Multan; and, with additions from the first source, the outer Himalayan Forests must be looked to for the supply of this railway.

The 'rukhs,' on which there has not been hitherto any great drain, except for construction purposes, are those in the Amritsar, Lahore and Multan Districts. In those of the Amritsar District, Dr. Stewart calculated that there was not more than a supply for the railway for one and a half years; while in the Lahore District, excluding the demands of the city of Lahore, with its 100,000 inhabitants, and the wants of the rural population, the supply might meet the requirements of the railway only for six or seven years. The Gogaria District is richly stocked, and fuel may be delivered on the line of railway at about Rs.12 per 100 maunds. This supply would, however, be drawn upon by both the Lahore and Multan Districts, in the latter of which there is only a supply for steamers and rail for four years.

In the aggregate, it is estimated that the full requirements of the Punjab Railway, with three trains daily, are 670,000 maunds, and for the Indus steamers 430,000 maunds, in all 1,100,000 maunds annually, whereas the total supply from the rukhs is not estimated at more than 3,278,000 maunds, or about three years' supply. The inadequacy of this source is manifest, the least period in which the reproduction of the timber can be counted on being ten years.

The absolute necessity for taking immediate measures for the timely reproduction of timber in the rukhs having thus been brought under the notice of the Punjab Government, no time was lost in giving effect to the various suggestions made by Dr. Stewart and the Financial Commissioner."

The Secretary of State's (then Lord De Grey and Ripon) Despatch R., No. 8, dated 28th February, 1866, is of high interest owing to the statesmanlike view it takes of the position and the reminder that the wants of the people must not be jeopardised in the interests of the railways and steamer flotillas.

"The wants of the railway and of the steamboats plying on

the river are those principally dwelt upon in this Despatch, although allusion is made to the wants of the population of the city and district of Lahore. I trust I need hardly remind your Excellency in Council that although every facility should be given to the railway and steamers, they can have no exclusive right to any supplies from the Forest Department, and that the market must be considered equally open to the rest of the community of the Province as to them, and provision for their wants must be as much considered.

It must be remembered that a similar increase of demand is arising all over India, and that the difficulty of adequate supply is especially felt in the neighbouring Province of Sind. I acknowledge, with much satisfaction, the exertions that have been made of late years throughout Her Majesty's Indian territories, but the utmost care, watchfulness and exertions, on the part of the Forest and Revenue Officers, will still be necessary to prevent a very serious deficiency.

I feel no doubt that Your Excellency in Council, and the Governors and Lieutenant-Governors of the other presidencies and provinces of India, will give those officers the utmost possible support in the performance of their duty of dealing out and husbanding the resources of the present forests, and of forming new reserves, and will give them the means of making their establishments efficient for that purpose.

This will be the more necessary, as you will learn from Sir Charles Wood's Despatch of the 12th instant, No. 10, in the Railway Department, that he has not been able to accede to your proposal for allowing the investment of the guaranteed capital of the railway company, in forming the plantations proposed by you. One of the sources of supply on which you depended is therefore cut off, and, as there is no doubt as to the demand continuing, it will be necessary that your Government should make greater exertions to provide the means of meeting it. I need scarcely add that I shall gladly sanction any well-considered outlay, with the object of increasing the means, either by working the forests now existing, or by forming new plantations, of enabling the Forest Department of India to meet the demands for timber and fuel which the wants of the population, and of the railway and steamboat companies, are certain to make on them."

Towards the end of the period herein considered a considerable correspondence on the subject of the require-

ments in sleepers and fuel by the railways already built, those under construction and those projected to be built in the Punjab, North-West Provinces and Sind was forwarded to the Secretary of State by the Government of India. These construction works and the consumption of fuel which would be required when the railways were in running order demanded, and would demand, a very large quantity of timber and fuel, and Brandis had been engaged in conjunction with the Railway Authorities and the Forest Officers of the three provinces in discussing the available sources of supply and the best methods of extracting it from the forests. It became at once apparent that the Forest Staffs of the three provinces would require considerable strengthening, and also that in some of the forests, it was thought in Sind possibly, it would be necessary to anticipate fellings and cut ahead of the possibility. To enable this to be done with safety Brandis was desirous of having trained men available for the purpose, and one of the first steps taken was to transfer Schlich from Burma to Sind. In addition six out of the seven trained officers who had recently arrived in India were posted to Sind, the Punjab and the North-West Provinces.

The new line to be constructed was the Indus Valley Railway between Multan and Sukkur, a distance of nearly 300 miles. At the rate of 2000 sleepers per mile this would require 600,000 sleepers 10 feet by 10 inches by 5 inches (or $3\frac{1}{2}$ cubic feet apiece), being upwards of 2,000,000 cubic feet. The locomotives would use wood fuel. At the rate of one train daily either way and at 1 maund per train-mile an annual supply of 219,000 maunds would be demanded. In addition a large supply of fuel for brick-burning would be required. The sleepers would have to come mainly from the Sind Forests. The fuel from the tamarisk (*Tamarix dioica*) and jhand (*Prosopis spicigera*) Forests of Sind and the Punjab.

The other new line was the Northern State Railway from Lahore to Jhelum. It was estimated that 2,200,000 sleepers would be required for its construction. It was necessary that these sleepers should be delivered on the three rivers Ravi, Chenab and Jhelum. It was hoped to be able to make use of the pines, silver fir and spruce to supplement the deodar supplies for this work and orders were issued to fell 5000 of the former species on the Chenab and 1000 trees on the Jhelum.

With a view to increasing the supplies of timber for these two railways the Government of India authorised the Punjab

Government to enter into engagements with several railway timber merchants in the Punjab, who were engaged in working the forests of Kashmir; under the permission of His Highness the Maharajah, to purchase from them annually a large quantity of deodar timber at fixed rates. It was hoped by the Government of India that "these arrangements will enable us to provide for a large portion of the timber requirements of the Indus Valley line."

The numerous papers bearing upon this urgent matter are most interesting reading, and show clearly the extraordinary demands which were thus necessarily made upon the new and but partly organised Forest Department. That it should have been able to rise to and grapple successfully with an unexampled position, as it undoubtedly did, affords perhaps the greatest testimony to the great administrative gifts possessed by Brandis and to the energy and ability shown by his staff. That the work was intricate and dangerous is obvious by the admitted necessity of having to anticipate the fellings in certain regions, and this in the absence of an adequate knowledge of the contents of the forests. So far as could be done Brandis' arrangements guarded against this danger—a danger which, outside the Government of India and the Secretary of State, was but dimly apprehended or understood by the officers of the Local Governments and Administrations.

This matter is dealt with at greater length in the following chapters on the North-West Provinces.

CHAPTER VIII

THE INTRODUCTION OF FOREST CONSERVANCY INTO THE NORTH-WEST PROVINCES AND OUDH, 1865-70

IT has been already shown that in 1865 Forest Conservancy in the North-West Provinces (now called the United Provinces) was in the hands of the Commissioners of Divisions, who had been appointed *ex officio* Conservators. It is not apparent from the records how this departure, which had not been made elsewhere in India, came about. It may have been at the instigation of Colonel Ramsay, Commissioner of Kumaun, who it was well known had taken an interest in the forests of his charge and wished to keep them in his own hands. It is on record, however, that in 1864 the Government of India had applied to the Secretary of State for sanction to the appointment of Dr. Jameson as "Inspector" of Forests in the North-West Provinces as a temporary and provisional arrangement, pending the more complete organisation of the Forest Department. The Secretary of State (then Sir Charles Wood, who during his tenure of office showed such keen interest in the organisation of the Forest Department in India and the preservation of the forests) accorded his sanction to the appointment; but it was never made. The omission to bring the Provinces into line with other parts of India undoubtedly put back Forest Conservancy in them at the period.

In the previous volume (Ch. XXVI) a description has been given of the activities of Webber (the Forest Surveyor) in exploring the hill forests in Kumaun and Garhwal. He subsequently descended to the sâl forests of the submontane hills and carried out his investigations and surveys in the sâl forests there and in the Bhabar.

The Forest Surveyor commenced his explorations from Huldwani, so well known to later generations of Forest Officers in the North-West Provinces. Huldwani he describes as an oasis in the dry Bhabar. There is no water in the Bhabar. On leaving the hills all the rivers flow underground beneath the stony river-beds, only coming to the surface again on reaching

the Terai region to the south. During the monsoon months only, the river beds in the Bhabar are occupied by a turbulent flood of rushing waters: Huldwani was the head-quarters of a canal system which had been constructed by the Government. These canals carried the water from the hills, by means of which great tracts of the Bhabar were reclaimed from the forest by irrigation. This work had been undertaken under the direction of Colonel Ramsay, and there were at the period hundreds of acres of cultivation, settled by thriving and industrious Kumaonis. The great belt of sâl forest stretched from here in an easterly direction by south for a 1000 miles, with few intervals. Some of the forests of the region administered by the Commissioner had already benefited to some extent by the measures of working and protection he had introduced. Webber notices that in parts areas "contained trees 40 feet high and growing healthily. There were immense numbers of fine saplings 20 feet high and in time there will be sâl-timber galore."

Webber describes the forest types of this region, with the large savannah areas of tall grass, which are now well known, and states that the natives who grazed cattle in the forests took care to burn all the long grass, in order to get up young green grass as soon as rain fell, the fire spreading from thence into the forests. He does not appear, at this period in his forestry career, to have appreciated the damage done by fires in the forests, of which he had had little experience, but he admits "that in reserved forests it is advisable to exclude fires, in order to give seedlings a good start"—a somewhat lukewarm assent to the crying need that adequate fire protection should be introduced into the country if the forests were to be saved from inevitable destruction. From his remarks on sport it is apparent that at the period game of all kinds, including tiger, abounded in the forests. Several herds of elephants were also in existence in the region. But they were not now allowed to be shot, "being too valuable and scarce. They used to be captured by the Government Kheda Department, but are now allowed to roam in peace." Describing the great road which ran from Bareilly to Huldwani, Webber says it had been cut through the forest "running perfectly straight in both directions to the horizon. The trees had been felled well back from the great wide road, so as to afford no covert for wild animals too near its course." He notes the remarkable change in scenery which takes place on reaching the foot-hills of the

Himalaya, from perfectly flat plains to precipices and rocks and perpetual declivity, "where a flat place to pitch a tent is scarcely to be found." The forest, he records, which clothed the spurs and valleys in the foot-hills was much less injured by man, and in the steeper and more inaccessible places it was often quite natural and untouched, there being no roads or paths save animal paths.

The last survey (of 1865) carried out by Webber was that of the Forests of Gorakhpur, bordering on the Nepal country. His orders were to map out the forests of that district, of which he says little was known as regards their timber-producing capacity.

"The extensive forests had been looked upon by the civil authorities as of little value and almost exhausted, and indeed, the object of Government had been rather to permit the trees to be cut down and the land reclaimed for cultivation, so as to increase the land revenue. Large blocks had been given as grants to natives, who had worked out the fine timber, and then left the forests still uncleared and more worthless than before. The records and revenue maps of the jungle lands lying along the northern boundaries of the Gorakhpur District and frontiers of Nepal showed that there was a considerable extent of swampy Terai land, covered with long grass, interspersed with stretches of forest reaching southward along the banks of winding streams which flowed into the River Gandak, a considerable affluent of the Ganges. The forests were to be guarded from further depredation, and mapped out into blocks and reserves. The work of carefully surveying the whole extent was soon commenced, marking the boundaries of the various reserves, and ascertaining the character and quantity of the timber growing." A native official had apparently been in charge of this area hitherto, but did not seem to have ever entered the forests during his tenure of office, and he accompanied the Forest Surveyor as guide with considerable trepidation. Webber gives a vivid account of a cyclone, accompanied by hailstones the size of pigeons' eggs, experienced almost at the start of this work, which laid his camp flat and destroyed the whole of the crops, cattle and houses of the villagers in the line of its path, some half-mile only in width. The Government then, as now, ever concerned for the welfare of the people, at once came to the assistance of the ruined agriculturists, remitting all rents and taxes and affording other relief.

The Forest Surveyor visited the Sunari Forest, an area of considerable extent on the Nepal frontier. This forest consisted of a dense growth of sâl trees over 400 to the acre, interspersed with many other species, as is usual, "the stems which were not more than 8 inches thick standing so close together that an elephant could with difficulty force his way between." This forest had had all the good timber cut out long since by contractors, "to whom it had been let by Government to clear and make what they could." The present growth of young seedlings and shoots from the old stools was the result of only a few years' quiescence from the interference of man. Northward over the Nepal frontier the old timber in the extensive forest tracts had not then been cut out, "and the great stems of magnificent trees 100 feet high and 6 feet in girth are a sight to rejoice the heart of a Forester." It will be remembered that after the Gurkha War of 1815-17, the Gurkhas had shown how greatly they appreciated the value of the sâl forests, each tree of which they said was a mine of gold (I, p. 193).

In his Survey Report of Gorakhpur the average number of trees per acre were given as follows: Sâl seedlings, 95; crooked old trees, 52; coppice shoots, 111; total, 258. Other species, 120; grand total, 378.

In 1866 Webber was appointed Acting Deputy Conservator of Forests of Gorakhpur. "The regular work," he says, "consisted in dividing the forest into divisions according to a working plan," the ground to be worked over in a certain number of years. The forest was already full of sâl trees, but many of them had been spoilt by tapping for gum, and only the worst crooked stems remained after the good trees had been cut. There were, however, plenty of seedlings on the ground, and it was decided first of all to thin out all the bad stems which could not grow into good timber and leave nothing standing but straight young stems. The native demand for the crooked poles, called *ballis*, was good, as lately all cutting had been prohibited. Thus a considerable income accrued, supplemented by dues for grazing cattle, and the expense of thinning and cutting away creepers, which were choking the young sâl, was amply covered. The prevention of fires, so as to allow the seedlings to get ahead, was also instituted.¹

¹ It is of high interest to record that by 1921 a money yield of thirty rupees (about 45s.) per acre per annum was being realized in the Gorakhpur Forest Division, an area of under 200 square miles.

Fire protection was not, however, introduced without considerable difficulty, as will be shown subsequently.

Webber's final survey work was undertaken in 1866, when he was ordered to inspect and survey the Districts of Jhansi and Lalitpur. He was instructed to explore all the forests to be found and make a forest survey on the scale of 4 inches to the mile, showing the area under timber and scheduling the number of trees per acre into four classes. The railway was not then completed to Gwalior and travelling was by night, by *dak gharry* (posting cart) from Agra to Gwalior.

The Forest Surveyor first marched through the Forests of Bundelkhand. They were wild parts in those days, and there were many stories amongst the villagers of Tantia Topi and his followers making their last stand here. The Jhansi Division (now under a Commissioner) included the Districts of Jhansi, Lalitpur and Jaloun, which had formerly contained extensive forests. The natives had in former days worked the iron deposits which existed in many places and had cut down the timber for fuel. Webber records that little timber now remained, extensive tracts being covered with scrubby bushes and long grass. These areas were called *dhangs*, and were used for cattle grazing and for grass cutting and fuel for the supply of Jhansi. He said there was a large area of waste country capable of growing fine timber. The teak thrived well and was found along the Betwa River, but no large trees of any timber species then existed; the fruit trees, "mohwa" and "mango," had been protected by the natives, as also the "pipal" (*Ficus religiosa*) and the "banian" (*Ficus indica*). "The jungles proper," he wrote, "however depleted of useful timber, only need time and protection to produce a fine growth of young trees, such as teak 'sissu,' 'saj' (*Terminalia tomentosa*) and other kinds. The beautiful 'siassa' (*Dalbergia latifolia*) or Bombay rose-wood, is also indigenous, and ebony (*Diospyros*) is very common, though only in the sapling stage." Webber thus describes his method of work, camels being of course used in this part of the country. "The forest is traversed and mapped, the timber noted, and other observations made, and we get into camp in time for breakfast. The afternoon is perhaps occupied by a ride round on a long-striding *sawari* (riding) camel with a saddle holding two, the wooded country being sketched with the map and prismatic compass, a gun or rifle being always in the sling and ready for use if game turns up."



A FALGUTI RIVER, NEW PROVINCE, OWING TO THE DENTATION OF THE FOREST ON THE CATCHMENT AREA THE RIVER IS A RAGING TORRENT IN THE MONSOON AND ALMOST DRY AT OTHER SEASONS. A GOOD EXAMPLE OF THE WASTE OF WATER AND CONSEQUENTLY OF HYDRAULIC POWER

Prof. Dr. G. R. Ravi Varma, Bangalore

CONSERVANCY IN THE N.W. PROVINCES 27

Forests were more prevalent in Lalitpur, a large district south of Jhansi, with rocky ridges rising out of the plain interspersed with ravine country covered with low thorny scrub. Along the Betwa and Dhasan rivers were wooded flats where teak and sâl and other forest trees existed. Many of these areas were found to have been hacked about and mutilated by the natives, but a considerable portion was considered capable of growing good timber. The chief cause of the destruction of the timber which had taken place in the past was to supply the iron smelting which was carried out at Nuthi, Khera and elsewhere. The old mining pits were met with, abounding in very rich dark red ore, but were then scarcely worked. The manufacture of catechu from the *khair* tree was still carried on by the natives, and gums and frankincense were extracted from the trees. The Orcha forests, which were the property of the Raja, contained a considerable quantity of fine teak timber at this period.

"The Government," wrote Webber, "had, since the annexation of the country, been very neglectful of the forests, not only allowing the villagers to cut down their own timber recklessly, but permitting the entire area of forest, of which there was a considerable quantity (the Jhansi District contained an area of 1,029,295 acres of which 385,723 acres were waste, including 57,862 acres of forest), unoccupied by villages, to be devastated by the cutting of the best trees and the burning of charcoal. The price of timber for use in housebuilding and for firing was, in the Jhansi and Lalitpur cantonments, exceedingly high; and even *ballis* or poles, used in the villages for all purposes, were very dear and almost unprocurable. There is a great quantity of iron ore in the districts, which was formerly worked by the native *lohars* (blacksmiths). This accounts for the scarcity of timber in a country which is one-third forests. The native rajahs were most careful of their forest rights and preserved the teak and 'sissoo' and other useful timbers carefully, so that in the Orcha Forests there were plenty of fine trees; and no doubt could be entertained that only conservation was needed to restore considerable areas of natural forests, now cut down, to a state of valuable timber production. On the rocky ridges which rise out of the alluvial plains, crossing the country mostly in a north-easterly and south-westerly direction, excellent kinds of hard-wood timbers grow naturally (of the species already mentioned) and only

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require protection ; and teak would grow freely everywhere. Bamboos of several sorts, solid ones 12 feet long, and hollow large ones 30 feet and up to 70 feet long sometimes, used for a thousand purposes, are all over the country ; but hacked about and over-cut and not given a chance to flourish. The villagers are not ignorant as to the value of forests, but where every one cuts what he can, have simply been anxious to cut their share ; and where the Government has neglected the conservation of the timber, the wasteful example is followed by every individual. Hence the importance to the welfare of a country of forest management being undertaken by the State."

Webber alludes to the jungle tribe, called "Sahariyas," found in this Province, supposed to be the remnant of the indigenous inhabitants of prehistoric times. They resembled the other nomadic tribes of the country and lived a similar life to that of the indigenous races already described in Madras, Burma and the Central Provinces, cutting down the primeval forests to grow their crops, the method being termed *dhya* cultivation, as in the Central Provinces. As described by Webber, their practice was to hack the branches only off the large trees, leaving the bare stems standing unfelled. The branches were strewn over the area and then burnt, the standing stems being scorched by the heat of the fire. Only one crop was taken off the area and the Sahariyas then moved on to another area in the forest. Their houses were constructed of bamboos and grass only, which they could put up very rapidly at a minimum cost of labour.

The district of Jaloun was next visited. It was found to contain very little real forest. In consequence the climate was intensely hot and the soil utterly dried up, except in the rains, when the ground, unprotected by trees, was washed away contantly towards the River Jumna. "There are," says Webber, "miles of ravines all sloping towards the river-bed, eaten out by the rains. Far back there are only slight indentations, which, lower down, become deep nullahs as the smaller streams unite, like the ramified growth of a tree. An entire district is permeated by these winding, branching valleys. It is easy to get lost in them, as all are exactly alike, and the labour of climbing up the ridges to ascertain the direction is considerable . . . and the heat of the sun beating down into the hollows is something appalling. The chief sound to be heard is the sighing of the hot wind, always sweeping on from

the north-west. The few straggling stalks of bent grass which find root in the caked, hard soil are always waving in the breeze, and the dust flying round. The scarcity of timber in these fertile plains is much felt by the villagers, and having no firing, they must use all the cow-dung, which ought to manure the land, as fuel."

This concludes Webber's Reports. He was transferred a year or two later to the Central Provinces as Deputy Conservator of Forests in charge of the Western Division of those provinces. He resigned owing to ill-health after ten years' service in the Department.

Allusion has already been made (I, p. 507) to the lease which had been obtained from the Rajah of the Tehri-Garhwal deodar forests in 1864. Owing to an unfortunate oversight on the part of the North-West Government only deodar and not other species of timber trees had been included in the lease. In the Chamba lease all species were included.

Mr. Sibley, the Chief Engineer of the north-west division of the East Indian Railway, it will be remembered, had been so impressed with the value of the chir (*P. longifolia*) forests of British Garhwal that he had made a proposal on behalf of the Railway to work them for sleepers, and sanction had been given for a certain area of the forests (Mandaghee) to be leased to the Railway for the purpose, the Forestry Department to superintend the operations.

These proceedings were communicated to the Secretary of State by the Government of India in the R.F. No. 15, dated 17th November, 1865, and they added :

"We may remark that both the British and Native Garhwal forests will aid in the supply of sleepers for the Delhi Railway as well as for the East Indian line in the North-West Provinces."

In the cold weather of 1864-5 Mr. O'Callaghan, Assistant Forest Surveyor, carried out forest surveys of the forests in the Dun and those of the watersheds of the Rupin and Tons Rivers. The work accomplished in the Dun was of high value and considerable interest in view of the importance which these forests were to ultimately achieve both from the educational and other points of view. On this subject the Commissioner of Meerut (who was *ex officio* Conservator of Forests) wrote :

"His work in the Dun in the cold season has been invaluable. Without his aid we should never have traced out the old forest

boundaries, and adjusted the new lines. But all this has been done in the Western Dun thoroughly well.

The office will be supplied with good maps, showing the boundaries of each forest, with marginal notes, describing any marked topographical features, touching or adjoining any of the lines; marking the sites of the pillars by references to easily recognisable local objects, with the distances of such from the pillars; giving the length of the lines between the pillars, and the exact bearing, recording how the new lines were arranged, whether they are entirely within the old forest boundaries, or have been adjusted by mutual interchange of land. In fact, we shall have an indisputable history and map, and description of the boundaries of each forest."

Mr. O'Callaghan's Report of his surveys and investigations of the Rupin and Tons Forests is dated 1st February, 1865, and is accompanied by several maps, including an index map. The country described is now well known, but Cleghorn's summary of the Report, made as Officiating Inspector-General of Forests, is of interest, since it portrays the small knowledge of these areas which the Government possessed at this period. It will be remembered that Cleghorn had recorded a brief note on these areas in his Report on the Punjab deodar areas (I, p. 406).

"Mr. O'Callaghan noted a very fine deodar forest south of the village of Kunain, elevation 6800 feet, two miles from the Simla and Mussooree road, and considered that sleepers sawn in the forest might be removed to the road and river.

At Mashak, a sleeper contract is being carried out under the supervision of the Deputy Conservator, thence the sleepers are sent some distance by land to the Tons.

The ridge approaching the Lambatach Station is fairly clothed with deodar, succeeded in the elevation of 8000 feet by tall, straight *Kursoo* oaks (*Quercus semicarpifolia*) of unusual size. The spur running to the village of Surars is well covered with deodar, and also a parallel spur leading to Paoti; on the latter, the deodar is finer and more abundant (Sheet No. 18).

At Barunti is a fine deodar forest (Sheet No. 20), elevation 6600 feet, situated on the south fork of the Tons. This had been worked to some extent by Mr. Wilson, and seems to be one of the few forests from which logs may be floated down the Tons into the Jumna.

On the Khuror, a small tributary of the Rupin, is a forest



KONA FOREST REST HOUSE, JAWA, HIMALAYA. THE SURROUNDING FOREST IS DEODAR
 (Cedrus deodara)
 Photographed by Mr. and Mrs. A. M. Adams, U.S.N.

of deodar, but Mr. O'Callaghan does not think that logs could be floated into the main river.

From the junction of the Surar stream with the Tons, up to its confluence with the Rupin, a fine 'cheel' forest, here called surli (*Pinus longifolia*), (Sheet No. 18), occupies easy slopes on both banks down to the river bank. If Government requires this timber, the logs may be had of great length near the water, and in accessible positions."

O'Callaghan measured and compared the different thickness of the bark of deodar and chir pine, finding that one-tenth the volume of a tree was lost by barking the former and one-sixth by barking the latter. He also reported that the Himalayan box tree was plentiful and of good size, the largest bole seen being 9 inches in diameter. This was sent to Rurki for experiments for wood-engraving purposes. Up the valley of the Rupin, near Dodra, he found an extensive mixed forest of spruce chil (*P. excelsa*) and silver fir, the river being floatable here. At Pondaru, on the Barabati branch of the Rupin, deodar was abundant. This forest was in Bushahr (Punjab) and had been already included in the lease of the Bushahr Forests obtained from the Rajah.

Cleghorn's summary continued: "The importance of obtaining leases of forests for the Native Chiefs is obvious from the statements made in this Report relative to the proceedings of Sodha Singh, a railway Contractor, who had received a 'purwannah' from the Rana of Taroché (in the Punjab) to fell timber in his territory; the Contractor is reported to have cleared the whole hill-side of chir, sissou and tun both within his own limits, and it is thought had extended his operations into British territory in the North-West Provinces, the two boundaries meeting here."

On the subject of the floating capabilities of the river O'Callaghan made some remarks. Cleghorn summarises the position as follows:

"The *Rupin* is an untried stream, but the hillmen say that timber may be floated down. They also assert that 12-foot logs can be taken down the north fork of the Tons, but Mr. O'Callaghan recommends that 18-foot logs may be launched. There appears to be more certainty regarding the south fork of the Tons. Mr. Wilson began felling at Datmir, anticipating no difficulty, but the logs were not put into the water owing to a misunderstanding about rates."

For the Tons River O'Callaghan expressed the opinion that any timber sawn, or in log, once below Naintwar, would reach the Dun, as logs of 35 feet and 40 feet were obtained from the spot where he measured Mr. Wilson's fellings and floated down and made use of for the scaffolding of the Jumna Bridge at Allahabad. Two obstructions to floating existed below Naintwar : (1) a mass of rocks in the river-bed, caused by an avalanche some 30-40 years before, (2) a clump of 20-30 chir trees growing on an island in the centre of the stream. These two impediments could be removed at trifling expense. The Report is of interest, since many of the suggestions it contains have since been carried out and the forests exploited of the old growing stock they contained.

The Secretary of State (R.F. No. 7, dated 28th February, 1867), in commenting upon this Report, wrote :

" Paragraphs 20 to 23 of Mr. O'Callaghan's Report contain additional proofs of the necessity of securing leases of forests adjacent to British forests, whenever it is not impossible to do so from the unreasonableness of the terms asked by the proprietors. This has been often referred to in Despatches to your Government, and was again noticed in Lord de Grey's Despatch of the 28th February, 1866, No. 10, with relation to the forests of the Central Provinces. Besides the difficulty of preventing the plunder of British forests when the neighbouring forests are held by individual proprietors, it is also highly important to be able to introduce an uniform system of management into all the forests, and more especially into those which adjoin one another."

As has been already described, Webber, as Forest Surveyor, had been carrying out Forest Surveys in Kumaun and Garhwal and elsewhere in the North-West Provinces. His work received the commendation of Government, but in the absence of a Conservator of Forests in the provinces it had not been carried out on the lines laid down by Brandis for such preliminary investigations nor in keeping with the methods instituted in other provinces. These points are well drawn out in the Government of India's letter No. 305, F., dated 12th September, 1867, acknowledging receipt of Webber's Report on Kumaun and Garhwal. They wrote :

"When the appointment of a Forest Surveyor and an Assistant were sanctioned by the Government of India in March, 1864, it was said that these officers should be employed

in the work of surveying and demarcating the forest tracts to be placed on the footing of reserved forests in Kumaun, Meerut, Rohilkund and, if required, in the other divisions. It is believed that the most important of these forests are the sâl forests in the Dhoons, the Bhabur and the other hills of the Kumaun and Meerut Divisions, and the deodar forests of Jaonsar-Bawur and the Bhagaruttee Valley (leased from the Teree Rajah). Of these no survey Reports have as yet been received, and I am directed to suggest that the survey of these forests be taken in hand, either by Mr. Webber, or by another competent officer.

Should this suggestion be adopted, it will be desirable to arrange the work on a systematic plan, so as to obtain data upon which to base a rational system of management for these forests. The officer charged with the work should, in the first instance, make himself acquainted with the methods pursued, and the results obtained by forest surveys in other provinces of India, which will be found in the various forest Reports of Burma and of other provinces, communicated from time to time to the Government of the North-Western Provinces by the Governor-General in Council. And, further, the North-Western Government might, on such matters, usefully consult the Inspector-General of Forests; and even permit the Forest Surveyor, charged with this work, to place himself in direct communication with Dr. Brandis for advice regarding the methods most suitable to be employed, under the peculiar character of each forest district.

I am further directed to enquire what practical use His Honour the Lieutenant-Governor intends making of Mr. Webber's surveys now acknowledged. The only natural deodar forest mentioned, high up the Dowlee River, appears to be quite impracticable for the export of timber; some of the others might, perhaps, be increased by planting, if conveniently situated for local consumption or for export.

I am also to enquire whether none of the forests of *Cypress* or *Pinus excelsa* are likely to repay strict conservancy. And, lastly, I am to suggest whether it would not be useful to demarcate some of the best 'chir' localities situated near rivers which afford facilities for floating. It does not seem unreasonable to expect that in time a demand will arise in the plains even for the timber of the *Pinus longifolia*."

The Secretary of State (R.F. No. 36, dated 16th December, 1867) was equally emphatic on the want of systematic

organisation in forest matters in the North-West Provinces and commented on the want of a Conservator of Forests :

"I join with your Government in lamenting that, from the circumstances which you mention, more useful results should not have been obtained from the labours of Mr. Webber.

It seems to me, as it does to you, that the appointment of a Conservator of Forests is urgently called for in the North-Western Provinces, and indeed, the whole Department should be at once organised and placed on a proper footing of permanence. It will be necessary, I need hardly remind Your Excellency in Council, to choose for the office of Conservator some officer, if such can be spared, who has had considerable experience in large forests in other parts of India, and one, moreover, who will conduct the forest operations in harmony with the Revenue Commissioners, who hitherto appear to have had the superintendence of the Department in addition to their other duties.

I find that in 1864 my predecessor, Secretary Sir Charles Wood, assented to the proposals of your Government for the Forest Department in the North-Western Provinces, and among them to the appointment of Dr. Jameson (Superintendent of the Botanical Gardens, Saharanpur) as inspector, as a temporary and provisional arrangement, pending the more complete organisation of a Forest Department. It was only lately that I learned from the papers respecting Dr. Jameson's salary that not even this arrangement had been made.

With regard to the Department itself, I would suggest to Your Excellency in Council whether it would not be expedient to consolidate it with that under the charge of your own Inspector-General of Forests. This might be found advantageous, regard being had to the local position of the forests under the two Departments respectively. It might perhaps also tend to superior efficiency by affording facilities for selecting men of more experience, and affording them a greater field for promotion. In any event, I am of opinion that the Conservator to be appointed should be instructed to consult freely with the Inspector-General on all important matters of conservancy."

The appointment of a Conservator came the following year. The Secretary of State's R.F. No. 22, dated 7th October, 1868, on this subject is as follows : "I have had under my consideration in Council the Despatch from Your Excellency

in Council, numbered 170, Financial, and dated the 17th July, in which you submit for my approval the proposal to appoint a Conservator of Forests for the North-Western Provinces, on a salary of Rs.1,200 a month.

I confirm your proceedings, which are in accordance with my Despatch in this Department of the 16th of December last, numbered 36. The forests appear to be of considerable extent, importance and value: and you intimate in your resolution that a further increase in the salary to Rs.1,500 may eventually be necessary, but that it is not at present necessary to settle that point. I shall be prepared to consider this proposal should you find it necessary to make it.

I entirely agree with the opinion expressed in your resolution, that it would have been highly inexpedient to have amalgamated this office, as it is now proposed to constitute it, with the charge of the gardens at Saharanpur. The offices are distinct in character, and the same qualifications are not required for both."

It will be noted how the idea that the office of Conservator of Forests and Superintendent of a Botanical Garden had persisted from the time of Dr. Gibson's appointment as Conservator in Bombay in 1847.

Major G. F. Pearson, the first Conservator in the Central Provinces, was transferred as the first Conservator in the North-West Provinces, and the Government of the latter provinces could not have found a better man in India to take up the work of introducing a proper organisation into their forests. That his work was sound is evidenced by the magnificent forest estate which has since been built up. Pearson gave generous commendation to the good work of the Commissioners during the period they had been *ex officio* Conservators of Forests, and especially eulogised the work of Colonel Ramsay in this connection. But the Forest Report for 1866-7 furnishes abundant evidence of how backward this Province had remained in all that related to the introduction of a true forest conservancy.

The Accounts detailed in this Report revealed many inaccuracies, and the prescribed departmental forms had in some cases not been followed. Colonel Ramsay indeed stated that many "were not suited to the system of working in the forests under his control." It was intimated to this officer

and others that it would be necessary to follow the forms in future as closely as might be possible.

Considerable progress had been made with demarcation of Government forests in the Jhansi and Lallitpur districts and in the Dun. In the latter the demarcation line along the southern face of the Siwaliks was converted into a road passable for carts at the low rate of Rs.122 a mile. O'Callaghan had been engaged in making a road to open up the Bhageeruttee deodar forests, and a commencement had been made with the demarcation of the Jaunsar deodar forests. A certain amount of timber had been sold from these forests to the new military cantonment of Chakrata in the hills.

An attempt had been made to lay a boom across the Ganges at Seepree at the point where the road leaves that river. This attempt had failed. Should success result from a fresh attempt it was proposed to form a depot at this place for all the timber felled in the Bhagaruttee Forest. "It appears doubtful," said the Report, "whether the boom is likely to succeed, unless a favourable locality, such as a long quiet reach of the river, is available, and it may perhaps be found expedient to introduce the plan followed in the Punjab, of catching the loose drifting logs by employing men floating on inflated skins (mussuks)." In reviewing the Report the Government of India gave expression to the following decided opinion on the subject of the procedure to be followed in demarcating reserves, which will illustrate the fact that the Authorities had recognised from the outset the primary necessity of demarcation of boundaries. Referring to a remark of Colonel Ramsay's the Government of India wrote :

"In the forests of Kumaun and Gurhwal good progress appears to have been made in diminishing the injury from cattle, and in checking jungle fires. In paragraph 5 of his Report, the Commissioner of that Division states that it is unnecessary to specify by names in the Report the different forests that have been set aside as reserved forests, but I am directed to explain, with reference not only to Kumaun, but to all divisions in the North-Western Provinces, that a descriptive list of the forest domains of the State gives necessary and important information, and the submission of such a statement is expected by the Government of India.

Each forest that has been demarcated and set apart as a State forest reserve should be entered in a register, with a

statement of its boundaries, the character and description of the forests, and the lines of export from the same. It should also be stated in this register of reserves whether Government has complete control over the forests, or whether the inhabitants enjoy the rights over wood, grazing and other forest produce.

From paragraph 14 of Colonel Ramsay's Report it is inferred that the inferior forests are left for the use of the villagers in the neighbourhood. This is satisfactory, and may, His Excellency in Council trusts, be looked upon as the commencement of an important measure, the establishment of village forests for the use of the inhabitants."

This clear pronouncement of the necessity of clearly demarcating reserved forests on the ground and the upkeep of a detailed register is not without its value for other parts of the British Empire at the present day. In some of the Dominions and Dependencies this recognition is only now being given effect to, whilst in others it is doubtful whether this essential preliminary to the conservation and preservation of a sufficient area of forests for the future requirements of an expanding population has yet received adequate recognition.

The second point, the provision of village forests, was in a more precarious position. The mistake was made in India of making over such areas to the villagers to be exploited and ruined in the old-time fashion. It was not until the serious deficiency arising from the unchecked destruction of these areas had begun to make itself felt that a sound policy in this direction was introduced. This mistake is one which, with the Indian experience before them, the younger forest services of the Empire should be able to avoid.

An interesting summary on the subject of the Canal Plantations on the Ganges and Jumna is furnished in the Section on Canal Plantations. A statement is given of the trees growing on the canal banks in separate plantations, and on *rajbuhas* on the Ganges and Eastern Jumna Canals. "Excluding seedlings in nurseries, the results calculated on the area of these plantations, as lately reported in a Report by the chief engineer, Irrigation Works, forwarded with your Letter, No. 9, F., dated 4th January, 1868, are as follows :

	Acres.	No. of Trees.	No. per Acre.
Ganges	17,750	12,00,000	67
Eastern Jumna	3,150	2,42,575	77

The financial results of the Canal Plantations during the year under review are as follows :

	Rs.
Receipts	51,177
Charges	28,014

Surplus Rs.23,163

Of the divisions, Kumaun and Garwhal (Col. Ramsay) had done the best and showed most of the revenue of the year ; but progress had been made in the Meerut Division. The Rohilkund and Benares Divisions were not so advanced. The financial results of the year were as follows :

	Rs.
Receipts	5,77,456
Charges	3,51,102

	Rs.
Difference of value of Stock	75,080
Decrease of Liabilities .	55,214

	1,30,294
Decrease of outstandings .	71,553
	58,741

Net Revenue Rs.2,85,095

In 1864 the Canal Plantations in the North-West Provinces and the Punjab had been placed under the Forest Department, although Brandis had dissented from the proposed action. In a note dated 11th October, 1869, Brandis suggested that these plantations should be retransferred to the Canal Authorities. His reasons were as follows :

“ In my opinion the Canal Plantations bear the same relation to the Forest Department as the planting of groves and avenues in the Central Provinces. The charges on that account are not defrayed from the Forest Budget grant, yet the annual Report is reviewed in this Department, and the Forest Officers are expected to assist Deputy Commissioners in the matter whenever an opportunity offers.

Practically the Conservator of Forests in the Punjab has exercised no control over this work, and his advice will be listened to more readily, I believe, when he ceases to hold his present official position with regard to them.

In the North-West Provinces the duty has been given to Dr. Jameson. The Canal Plantations are spread over long distances, constantly run over by Canal Officers; but Forest Officers, in order to see them, must go out of their way at a distance from their ordinary work. They cannot, except at a great sacrifice of time, make themselves familiar with these plantations, and the result is that Canal Officers are much better at home in their plantations than Forest Officers.

The result is that any recommendations of the Conservator are regarded with mistrust. And, after all, the present generation of Forest Officers have not more experience in planting of this kind than many Canal Officers.

The question only affects the Punjab and the North-Western Provinces, and if orders were passed at once the Canal Plantation Division might be excluded from the Budget of 1870-1, and transferred to Irrigation."

The Government of India and the Secretary of State sanctioned this suggestion.

In the review of the 1867-8 Forest Report the Lieutenant-Governor (Sir William Muir, K.C.S.I., subsequently Principal and Vice-Chancellor of Edinburgh University) referred to the failure to establish a boom upon the Ganges, and continued: "These are the last Reports which will be received from the Commissioners of the Meerut and Kumaun Divisions, the Department having been now entrusted to a separate Conservator," and he offered the thanks of Government to the Commissioners for the labour and skill devoted to the management of the valuable and extensive forests of their divisions.

The Forest Report for 1868-9 gave evidence of the presence of a Conservator of Forests in the Province through the first commencement of a systematic management of the forests as a whole, and this fact was recognised by both the Lieutenant-Governor and the Secretary of State.

The arrangements which were being made in the Punjab to meet the heavy demands for sleepers for the new railways under construction have been already alluded to in the previous chapter; they had their counterpart in the North-West Provinces. In their letter, No. 1026, R., dated 30th July, 1869, the Government of India, P.W. Department, addressed the Inspector-General of Forests on the subject of the supplies of sleepers which would be required from the forests of the North-West Provinces for the line of railway between Delhi and

Rewaree, the survey of which was then in hand. Being aware, said the communication, that the Punjab Forest Department would be taxed to the utmost to supply timber for sleepers for the Punjab Northern (State) Railway, the Government of India desired Brandis to communicate with the Conservator of Forests in the North-West Provinces with reference to the supply of sleepers, required for the Delhi-Rewaree Railway, which would have to be supplied at Delhi, commencing from the cold season of 1870.

"It will be desirable to ascertain the probable yearly supplies and to caution the Forest Department of the North-West Provinces against entering into contracts or accepting indents for the supply of timber which could be used for sleepers, etc., from the more westerly forests. Major Pearson should be asked to advise generally as to the best sources for obtaining sleepers for railways in the North-West Provinces or to the south from Delhi to Agra."

A considerable correspondence took place upon this subject, but much of it was written in the absence of any complete knowledge of the supplies available in the Himalayan hill forests and plains (sâl) forests of the North-West Provinces.

This information was supplied subsequently in a series of remarkable Reports written by Pearson after detailed visits to these areas. It is due to the demand for timber which thus suddenly arose owing to the rapid extension of railways that we are indebted for a concise record of these forests at the period, and to a considerable expansion of the Department. The Government of India were prepared to sanction the scale of staff deemed necessary for the work in the forests and at the timber depots, and also to allocate sums necessary for the requisite communications to open the forests.

The details of the proposed schemes and the amounts of timber required during the five years 1870-4 are explained by Brandis in notes written at the time.

"The stock of timber that can be floated down the Jumna and Ganges rivers, and that can thus be made available for the Delhi-Rewaree line, is believed to be larger than the stock of growing timber in the hill forests under the Punjab Forest Department. But much less is known regarding the quantity available in the different forests than in the Punjab, and up to the time of Major Pearson's appointment operations in the Meerut Division were carried on in a most irregular and

unbusiness-like manner, so that the Conservator must be allowed some time to organise efficient establishments, and to arrange a regular system of operations. It would not be prudent rapidly to extend operations before that portion of the forest establishment of the North-West Provinces has been placed upon a satisfactory footing ; very great damage would be done to the future prospects of the forests if careless and irregular cutting were allowed."

To Pearson, Brandis wrote as follows :

" From the information before me it appears probable that, commencing with January, 1870, sleepers for about 50 miles annually will be required. At the rate of 2200 sleepers per mile, including sidings, this would amount to 110,000 sleepers per annum. The sleepers will probably be 10 feet by 10 inches by 5 inches, or $3\frac{1}{2}$ cubic feet each. Unless you should deem it expedient to cut sleepers in the forest, the timber would be taken over by the railway officers in the rough state as it comes from the forest. Except to facilitate land carriage you will not probably find it profitable to cut sleepers. It is true there is risk that railway officers may cut up your timber in a wasteful manner, and thus defeat one of the aims of Forest Conservancy, the economy of material. But, on the other hand, the attempt to cut sleepers at depots on behalf of the Forest Department will require an undue increase of establishment employed outside the forests. But you should arrange to have a sufficient number of logs cut into sleeper lengths, allowing a sufficient excess in length.

The timber will at first be wanted at Delhi, but the railway officers will be prepared to take charge of it at your depots in the Dhoon, which I suppose would be the most convenient arrangement for your Department. I doubt whether you will be able to deliver the whole quantity on the Jumna, and suppose that a portion must be taken on the Ganges, provided the railway officers can manage without undue expense to float the timber down the Ganges Canal to Meerut.

The delivery of the above quantity would require a supply of 770,000 cubic feet annually, on the supposition that one-half of the timber will be wasted in cutting up into sleepers. At 50 cubic feet per tree, this would require the felling of 15,400 trees annually, and the first question is whether the Jaunsar-Bawar and Bhagaruttee Forests can stand this drain.

For the Northern State Railway in the Punjab I have

suggested the use of *Pinus longifolia* on a moderate scale, by way of experiment, and a small experiment might be made on the new Delhi line also ; but, unless impregnated, I would not advocate its use on a large scale in the climate of the North-Western Provinces. The main quantity, therefore, should, at the outset at least, be deodar, and I beg that you will inform me what quantity of that wood you will be able to deliver at the Jumna and Ganges depots during 1870 and 1871.

If the season is not too far advanced, and if you consider it otherwise advisable, I would also suggest your arranging for an extension of felling operations in the Jaunsar-Bawar and Bhagaruttee Forests.

Under all circumstances I request that you will furnish me with an account of the present timber operations and with your proposals in this respect for next season. This should be accompanied by a map of the forests, however rough, but on a scale sufficiently large to exhibit all needful detail.

In connection herewith I shall transmit for your information copies of two letters which I have lately addressed to the Officiating Conservator, Punjab, on the subject of arranging regular plans of operations for the forests under his control, and on the principles to guide officers in the arrangement of felling operations in deodar forests.

It may be necessary, in order to meet the present requirements, to anticipate felling operations considerably ; but you will easily understand that this will require the greatest caution, and should not be attempted without a well-considered plan of operations, and rules to guide the selection of the trees and the operations themselves, so as to secure the complete and rapid reproduction of the forests, either by natural means or by sowing and planting. The question, whether it will be right to extend felling operations as here suggested, will, to a great extent, depend on the power you may have of excluding cattle and fires from the localities where the timber has been cut.

The necessity to meet these requirements will, to a certain extent, interfere with the supply of timber for other purposes ; but though it will be necessary to give to the State Railway Officers the first refusal of all timber suitable for railway sleepers to the extent indicated above, still arrangements should be made to make the balance that may not be taken by them available for other purchasers.

The Government of India also desires to have a general

Report on the best sources for obtaining sleepers for railways in the North-Western Provinces, or to the south from Delhi or Agra. This reference has no connection with the enquiries made in the first part of this communication.

The sources to be discussed would be :

- 1st.—Timber floated down the Jumna, deodar and 'cheel.'
- 2nd.—Timber floated down the Ganges, deodar and 'cheel.'
- 3rd.—Sâl timber from the Kumaun and Gurwhal Forests.
- 4th.—Sâl timber from Nepal.
- 5th.—Sâl timber from the Oudh Forests.

Regarding the two last-named sources I have addressed Captain Wood, but regarding the former three I beg that you will furnish me with the needful data, showing the quantities you expect to fell annually in and to bring down annually from the different forests during the next five years, from 1870 to 1874 ; the depots at which this timber should be delivered ; and the description, length and average cubical contents of logs to be brought to depots, and the quantity of sleepers 10 feet by 10 inches by 5 inches that you would find it convenient to cut in the forests or at depots." Brandis concluded as follows :

" Efficient and special supervision must be employed for these extended timber operations, otherwise there will be waste of money, material and damage to the progress of the demarcation, protection and improvement of the forests. Where timber operations are carried on on a large scale, it will probably be necessary to employ special officers for the work, who should, however, give due assistance in all operations of conservancy and improvement.

The system of accounts must be placed on a thoroughly efficient footing.

For each depot there must be a set of detailed rules regarding the keeping and disposal of timber, and responsible officers must be in charge of depots.

If these precautions are strictly observed, the operations now contemplated by Government will, I trust, eventually prove beneficial to the development of the Department. Timber operations are an excellent school for Forest Officers, and efficiently conducted timber operations on account of Government are the first step towards a sound and safe system of selling the timber in the forest, which is the end towards which all our work must be directed."

Subsequent experience has shown how true these opinions were. The great extension of railways at this period did much to place the Forest Department on its legs and enabled it to take its place in the administration of the country.

In a further note Brandis dealt with depots and staff.

"The question whether the Forest Department should be charged with the cutting of the sleepers in the north-west, must be looked at from many sides. For the present I will confine my remarks to the Ganges, as there will not, I believe, be a large quantity of timber down the Jumna for some years to come.

The depot for catching and rafting the timber is intended to be about 18 miles above Hurdwar, at a place where people can live only during the healthy season, say, six months. For sawing, therefore, a second depot would have to be made at Hurdwar, and I am not sure whether then the timber, the rafts being built at the upper depot so as to suit the canal, had not better go down to Meerut at once, and be cut up either there or at Delhi. The slabs and other residuum would also fetch a higher price at Meerut and Delhi, and I am not sure whether purchasers would come for them as far as Hurdwar. Much of the refuse, it is true, would be used as fuel for the sawmill. But if rafting on the Ganges Canal is uncertain and expensive, and the sleepers must be carried in boats, or by land, then it will be better to cut them at Hurdwar, and in that case the Forest Department could undertake the business provided: 1st, a sawmill is erected; 2nd, the needful establishment is allowed in addition to existing establishments; 3rd, the Conservator is permitted to select the men he wants from the Public Works Department, the officers and men, after a year's experience, if approved by the Conservator, to elect for permanent transfer to the Forest Department, or to return to the Public Works Department.

The requirements, at present, are given at 110,000 sleepers annually, but will increase. Supposing 100,000 sleepers were cut annually at Hurdwar, the outlay would be at R.1 a sleeper, Rs.1,00,000. This is a concern of sufficient magnitude to justify the organisation of an efficient establishment. The work cannot be done by the ordinary officers of the Forest Department. The main advantage of placing this concern under the Conservator would be that the Forest Department bring down the timber, and can arrange their

operations according to the supply expected from time to time, also that it would keep all sales of timber, sleepers, slabs, refuse, at and near Hurdwar, in one hand.

The matter should be very carefully considered, and action should not be precipitated."

In the next chapter Pearson's admirable Reports on the areas from which the materials required for this great work were to be obtained will be dealt with.

CHAPTER IX

THE INTRODUCTION OF FOREST CONSERVANCY INTO THE NORTH-WEST PROVINCES AND OUDH, 1865-1870 (*continued*)

PEARSON'S REPORTS ON THE HIMALAYAN AND PLAINS FORESTS OF THE NORTH-WEST PROVINCES

PEARSON'S investigations into the resources of the forests of Kumaun and Garhwal, the Dun, the Bhagaruttee Valley, Jaunsar-Bawar, the forests at the head of the Jumna and Tons rivers, and those of the Jhansi Division were all carried out during 1868 and 1869. The Bhagaruttee, Jaunsar-Bawar and Tons and Jumna Forests were in the Himalaya, the deodar being the species chiefly considered. The others were either in the foot-hills of the Himalaya, in the plains along their base or, in the case of Jhansi, at some distance from the great mountain range.

Pearson's Reports are lengthy, and it is unfortunately impossible to do more than deal with them briefly. A certain amount of detail will, however, be necessary in order that the position of these magnificent forests at this period may be appreciated.

The Report on the sâl forests was designated by the Lieutenant-Governor as a "clear and comprehensive Report," and he further observed "that the views of the Conservator as to their general condition and the vast treasury of valuable timber, existing and prospective, contained in them are considered highly satisfactory."

THE SÂL FORESTS OF KUMAUN AND GARHWAL

Pearson's description of the area occupied by these forests and its boundaries is worth reproducing.

"These forests extend from the Ganges on the west, to the Sardah on the east, covering the lower spurs and ridges of the Himalaya. They are bounded on the south by an excellent cart road, which has been constructed from the Ganges as far

as Karnote, in Kumaun. From thence the Pheeka River marks the boundary for about three miles, and from that point an irregular line, marked by roads and pillars, carries it on as far as the Sardah. The Ramgunga, and its tributary the Bursotee, are the boundary between the two grand divisions of Kumaun and Garhwal, while the Himalaya Mountains in the rear of both, shut them in like a wall towards the north. Except the Kumaun Iron Company's grant, which is clearly marked off by pillars, and a very few villages, which do not affect the actual forests in any way, and for the removal of which it has not been thought worth while in consequence to make arrangements, the whole tract forms a great State forest in one compact block, perfectly defined by natural and easily recognised boundaries. Within these limits no private rights exist which can prove injurious in any way to the forests, and cattle-grazing is entirely prohibited, except in a few places where the cattle can do no harm whatever. The taking up of fresh land for cultivation has been entirely stopped above the main road and, I believe, I may say that there is no State forest in India to be compared to this one for extent, compactness and perfect control."

The Garhwal Forests.—These forests consisted of four main divisions, commencing from the west: the Chandi Forests, Odeypur, Kotri Dun and Patli Dun. The Chandi Forests comprised an area of about 120 square miles and had, owing to their proximity to the Ganges, been completely worked out by contractors and agents of the Rurki workshops and the Public Works Department. Dry wood for fuel and bamboos were the only exports from the forests at the time. The area contained unsound trees scattered throughout the forests and sâl saplings, the latter showing considerable promise in some parts, in others tending to be suppressed by other species. The Odeypur Forests extended for about sixteen miles from the Rewassun to the Koh River. This tract had been formerly highly populated and well cultivated, but there was now a great absence of water through all the lower part of the forests. Only three tracts of sâl existed, one of which had been heavily worked by Captain Read. Bamboos existed all over the area and formed the main article of export. The Kotri Dun is the valley of the Sunnyi River and its affluents, and stretches between the Koh and the ridges of the Patli Dun to the east. The whole of this area, about 200 square miles, was a nearly pure sâl forest varying in character and value. Most of the

forests had been worked in the past, and from these it would not be possible to remove any more trees until the second class ones had grown into first class. The forests of Soowursote, Gireel, Panee Gangun Kumayree, Loharkotee and Silanee, being more inaccessible, still contained a considerable amount of fine timber which could be worked. "The soil," Pearson remarked, "was on the whole less favourable, and the effect of frost and fires had rendered the trees less clean in their bark and more knotty and inferior in their heads to those in more favoured localities." Since these forests had been rigidly protected by Colonel Ramsey they had made much progress, "and the keeping out of fires and cattle will in a few years do much more for them." A large trade in timber and minor produce existed from this area to Najibabad, from which the Meerut and Bijnor Districts were supplied. The former was furnished partly from the old logs lying in the forest, which traders were allowed to cut up and carry away on payment of a royalty, and partly by regular felling operations, the timber being collected at a depot at Sunnynee and disposed of there.

The Patli Dun, in area about 280 square miles, comprises the valley of the Ramgunga and its affluents and the ridges which run between their water-sheds. The whole of this Dun, Pearson said, had been a noble sâl forest, the lower and more accessible portions having been worked out. Enormous tracts of virgin forests still remained, "from which, under judicious treatment, inexhaustible stores of timber may be drawn as by degrees forest roads are completed through the valleys. Already excellent roads have been completed up through most of the principal valleys for the export of the forest produce, and indeed nothing has been left undone which good judgment and a thorough knowledge of the requirements of Forest Conservancy could suggest for the renovation of the forests." Pearson divided these forests into three divisions—Timooria and its affluents, Mondhal and Ramgunga Valley, South Patli Dun and Sonah.

The Timooria River has its source on the reverse side of the high ridges at the head of the Kotri Dun and joins the Ramgunga near Buxar after a course of some twenty-five miles. The whole basin within this water-shed contained a very fine sâl forest. Pearson's description of the area with sylvicultural details of the sâl is of such interest that it is reproduced here :

"The lower portions of this forest, especially along the right



THE RANGOON VALLEY, SHOWING THE SAL FORESTS, N.W. PROVINCE, DECEMBER, 1888
Photograph by Sir S. Laing Hume

bank of the main stream, and along the plateaux and ravines near the exit of its various affluents, have been very considerably worked about ten years ago by the agents of the Gun Carriage Department, and by Captain Reid and Mr. Finn; but I have no hesitation in saying that the effect produced has been to their great advantage, as too much timber was not taken from them. Since the forest has been rigidly shut up, the immense improvement of the second-class trees will be at once apparent to the most casual observer, as compared with the condition of the same class of trees in those portions of the forest which have never been worked. As the trees in the upper portion of the ravines are far too thickly placed together, and evidently fail to increase in size in consequence, opportunities should be taken of any demand for moderate-size timber to open the forests out more to the sun and light than they are at present. It is easy to observe how in such places the heads of the trees are bent out from the side of the ravines as if seeking for more light.

Lower down the valley towards the Ramgunga River, all over the plateaux opposite the mouth of the Manaltee stream at Chawulchura, and along the ravines to the mouth of the Bahlead nullah, the forests have been far too heavily worked previous to Mr. Finn's time. There are here, however, many fine old trees which, though unsound, have continued to shed their seed, and a large crop of sâl seedlings and young trees is now springing up on all sides, some of which are already assuming noble proportions, and show the highest promise. On some of the plateaux, especially those which were formerly occupied by the old cattle stations, either on account of the nature of the soil, or injury done to the trees by the cattle owners before their removal from the forests, the show of young trees is not so good, but on the whole nothing can be more satisfactory than the present state of the young timber.

It is also most satisfactory to observe how, since these forests have been rigidly shut up, the whole surface of the ground is becoming thickly clothed everywhere with bamboos, by which the moisture is retained in the soil, the increase of other grasses prevented, the risk of fires materially diminished, and the young forests generally protected from harm, and their growth encouraged."

The forests of the Mondhal are situated on the range of hills overlooking the valley through which the river flows. This

valley was well cultivated and contained several villages. The forests, owing to their remote position, had never been worked, but in a few places they showed traces of having been cleared for cultivation. Even in these areas, since felling had been prohibited, the sâl had again taken possession of the ground. Pearson wrote :

" There are here, in consequence, to be found an immense store of noble first-class sâl, as well as an abundance of trees of every age and size. The good forests may be said to extend over about fifteen miles in length, through all the lower portion of the valley below Janett on the slopes and plateaux facing the north, and on the opposite bank of the river over the last five miles. On the plateaux immediately above the river the trees have attained a very large size, but, generally speaking, they stand somewhat too thickly together, and would much improve if some of them were removed. But in order to effect this, and with a view to the sale of the wood, it will be necessary first to open a cart road up the lower portion of the Mondhal valley into the valley of the Ramgunga, and this will be a work of considerable expense, as the gorges become very narrow and precipitous on both sides near the mouth of the river. The work will therefore, in all probability, have to be done by a little at a time, as money can be spared for it ; as the details of the working plan, which it is my intention to propose, will not necessitate the carrying on of operations for the removal of the large timber in this valley for a number of years to come. In this valley, however, I propose at once to go on with the regular survey, as it will be most important to have an accurate estimate of its contents in order that we may know what reserve stock of timber we have in hand for future years, and may husband our resources accordingly. It should be mentioned that there is a large amount of fine ' toon ' in the valley, which seems particularly well adapted to its growth."

The forests of the Ramgunga and South Patli Dun were in a very different condition. Owing to their accessibility, in Pearson's words " they may all be said to have been *felled in, even to desolation*, by Captain Read, as well as by Mr. Finn and the native contractors who went before him." Owing to the old hollow trees having been left standing as worthless, thus serving as seed bearers, Pearson noted that " in most places they are now recovering themselves . . . and over most of the ground young timber of every size is to be seen rapidly



THE REMNANTS OF AN OLD SAI FOREST. THE TREES NOW STAND ON WHAT THE FAMILIAR N. S. G. BOULDER PROVINCES, APRIL 1889

coming on. The exception was in the valley near the river, where the removal of all trees had resulted in the tall tiger grass preventing the seedlings from coming through. "What these forests," says Pearson, "must have been in past ages is easily seen from the size and symmetry of the gigantic old trunks which have been left standing. At present the long grass gives cover to a number of wild elephants, but it is doubtful if the difficult nature of the ground would admit of their capture; and as they seem to confine themselves to regular tracts, it is not apparent that they do any great damage to the young sâl. The exclusion of cattle for the last five or six years has worked wonders, and it is to this point, and to the prevention of fire, that attention should principally be directed.

It has been said above that these forests have been worked to desolation, but perhaps even this does not give an adequate idea of the waste that has occurred, and the mischief that has been committed. Thousands of trees were felled which were never removed, nor was their removal possible; and a large revenue has been realised during the last few years by allowing passes to the people of the lower country to cut up and remove the dead timber on the payment of a royalty. There is also a very large export of bamboos from hence to the plains below. It may be added that in several places along the Ramgunga Valley there are fine patches of 'toon.'

The Patli Dun has lately been made accessible to carts by a good road constructed by the Forest Department, through the lower range of hills near Kalagurh and leading into the Bijnour District. For facilitating the removal of the dead timber and minor forest produce, this road will be of the greatest use, and will add considerably to the revenue of the valley."

The Kumaun Forests.—Pearson divided these into the Kosillah River Forests, Kumaun Iron Company's grant, the Nindhore and Serrara Garinner ranges, forests of the outer ranges and the Bhabar and the Sardah Forests (Kuldoonga).

The Kosillah Forests comprised a tract of about 400 square miles between the Ramgunga on the west and the Iron Company's grant on the east. A large portion of this area had been excessively worked by native contractors in previous years and by the Forest Department during the past three years. It nevertheless still contained a fair proportion of unworked forests: Doorgadeh, Timlipani, Koolbangadhera and Daudree.

Doorgadeb was the best of these, described as "a noble forest, all the trees being straight and well grown and of noble appearance, with clean bark and round, well-formed stems and free from undergrowth." A proportion of the trees here as elsewhere were unsound. Pearson estimated that from 8000 to 10,000 mature sound trees could be taken from these forests without over felling. About 9000 trees from the Bhoojaket and Seronlee Forests had been taken out by the Forest Department during the past three years, these forests being now closed. Pearson said that the selection of the trees for removal here had been very well done. That the forests had been improved by the removal of the old growing stock, and that when the time came to reopen these forests many more first-class trees would be ready for the axe. "In addition to the above," the Conservator wrote, "it is satisfactory to see some exceedingly fine and regular young forests springing up in this section. Among these, those of Amtoonolah and Chukur Nagul, east and west of the Doorgadeb plateau, are conspicuous; they are almost as regular in appearance as plantations, and contain trees up to 3 feet in girth and 50 to 60 feet in height. It is remarkable that the whole of the plateau on which these forests stand bears the mark of ancient cultivation, the trees springing up on the edge of the old fields. This is said to date from the time of the Chund dynasty, above a century ago, and one mature forest of trees has already been removed to make way for the forests which are now growing up. The young forests of Deolee Chour above Mohan are also in the best possible condition."

The lower forests nearer the plains were not in such good order and a mixed forest of other species had in some places supplemented the sâl. If fire could be kept out of these areas for the next few years Pearson had hopes that the sâl would get the upper hand again.

"Immediately above the cultivated lands of the Bhabar, west of Ramnuggur, the forests may be said to have been worked out, and as they are required as grazing grounds for the cattle of the Bhabar villages nothing more can be done except to protect the sâl from felling as a reserved tree. There is a block of mixed jungle about eight or nine square miles in extent in the plains beyond Dhela, seven miles west of Ramnuggur, in parts of which some fair young sâl trees may be seen; but as a whole, I have not much expectations from it in point

of quality, though from its accessible position it is by no means without value.

East of the Kosillah, and stretching up to the Himalaya, is the Kotah Bhabar, a sort of elevated plateau like the Doon, but more broken. The scenery is exceedingly beautiful in parts of it, and it contains some excellent sâl forests, which have been enough worked to require rest, but not too much to prevent a very fine store of timber being obtained from them when it comes to their turn to be worked. It would be well to leave them for fifteen or twenty years; but I believe there will be no occasion to work them before that time. The second-class and third-class trees are very fine throughout this tract. In this tract there are several villages with cultivation near the hills, but their limits have been strictly defined, and they are not allowed to keep any buffaloes."

The Iron Company's grant was about 400 square miles in extent, extending from the Munnar Gudderah as far as the Bukra River, about half-way between Kaladoongee and Huldwani. Pearson considered this a very valuable forest property. All old trees on it had been cut out and it was closed, but contained fine crops of young and middle-aged sâl on it.

The forests of the Nindhore and Serraragar were situated on the rivers of these names which rise close together in the lower Himalaya between Huldwani and the Sardah, but flow from the hills in opposite directions eventually reaching the Bhabar. The area of about 40 square miles contained by them was filled with another dense inaccessible sâl forest which was almost impenetrable, the trees being far too crowded; there was an admixture of "chir" pine in the upper elevations. With the exception of some parts on the slopes towards the Bhabar they had never been touched by man, and Pearson said nothing could be done to even commence their examination until a few footpaths had been opened out through them. He felt sure, however, that an enormous store of timber might at any time be brought out of these forests to their own benefit, once they could be opened out.

In the forests of the Outer Range and the Bhabar, Pearson included all the belts of sâl which covered the plateaux and slopes of the hills, and which extended far out into the Bhabar from Huldwani in the west to the Sardah on the east. Owing to their accessible position everything worth removing had long been cut out of these forests, and except in the upper ravines

and high up on the ridges no mature trees existed in this area. In addition to indiscriminate lumbering these forests had been exposed to extensive grazing, cattle stations having been established in the area. These had been removed outside the forests by Colonel Ramsay, as also the villages existing within the area. Alluding to these Pearson says, "In some places where the soil is suitable, and other circumstances have favoured the growth of the young trees, they are exceedingly fine, and show straight stems, clean barks, and fine heads. In other places where the soil is poor, but more especially where the numerous cattle stations formerly existed, and where, in consequence, the young trees suffered continually from being lopped, barked, and otherwise injured, and where they were more exposed to repeated fires, the trees are knotted, crooked and with poor heads. The best forests are perhaps those west and north of Chorgalia (where the old unsound trees which still remain are exceedingly fine in size and appearance), and those situated on the flats and plateaux above the Jugboora and Colonia streams. 'Toon,' as well as 'sissoo' and 'khair,' is also coming on well in many places. The main export, however, for some years will consist of minor forest produce and bamboos, of which a large quantity is carried away to the plains from these forests."

Of the Sardah Forests Pearson wrote: "About eight miles above Baramdio around Kuldoonga, near where the Ludy empties itself into the Sardah, there is a fine block of virgin sâl forest. North of the Poornagiree precipice the hills recede somewhat from the river, and form a series of plateaux and flats terminating in ravines, which run up into the higher ranges of hills, all of which (both along the Ludy and the Sardah, for a distance of six or seven miles) are covered with sâl; and from the favourable nature of the situation the trees have developed themselves here in a very remarkable degree. Taking it all in all, this is one of the finest forests in Kumaun, and it now may be said to be at its prime. There appear to be very few unsound trees in the forest; most of the full-grown ones being from 6 to 8 feet girth, and 60 to 80 feet high, with younger ones of every age in abundance. It would seem advisable after the clearing out of the Doorgadeb block of forest, to proceed next to work this one so as to get the sound timber out before the trees begin to decay.

There is a precipice below Poornagiree, which has hitherto prevented the export of timber along the river bank, and this

no doubt has saved the forest from being worked ; but the rocks here can easily be removed by blasting, as the difficulty extends for a short distance only. In the centre of the forest is the village of Kuldoonga, which has a large amount of cultivation round it. The presence of this village is no doubt objectionable, but its removal impossible. Its boundaries have been accurately defined by the Settlement Officer."

Pearson had deprecated the system on which the revenue from the minor produce of the Dun Forests was collected by "Khan Tehsul," but he said that the same system in force under Colonel Ramsay's regime here, carried out by the Messrs. Thompson, had worked well, a large revenue being realised at the small charge of 6 per cent only. This he attributed to the good roads which had been opened out in Kumaun and Garhwal, so that it was more profitable to bring out the produce by the road and pay the royalty at the forest "chowkees" than evade them as was possible in the, at the time, roadless Dun Forests.

On the subject of Colonel Ramsay's forest work as *ex officio* Conservator, Pearson spoke in the highest terms. After alluding to the unrestricted felling which had gone on before, he wrote :

"Felling of trees without permission was then first prohibited by Colonel Ramsay when he took charge, and Forest Officers were appointed. From that time conservancy has progressed with vigour. In 1861-2 the cultivation in the Patli Doon was put a stop to by assigning land to the people below the hills in the Bhabar ; next, the cattle stations were broken up, and all herds of buffaloes removed from the forests. This operation occupied three years, from 1862 to 1865, the cattle stations being removed from all the Garhwal Forests, and in Kumaun from all the forests above the main line of road. In the meanwhile excellent roads were opened out, and the forests, especially those of Garhwal, were made accessible from all sides ; at the same time a regular system was instituted of working only certain forests, the remaining ones being kept rigidly shut up, and the selection and marking of all trees previous to felling being insisted on. The clearance also of the forests from old timber which, after the operations of Captain Read and the contractors who preceded him, lay scattered over all of the forests, was commenced, the wood being removed by native merchants on payment of a small royalty, which has brought in

a handsome revenue now for several years, and has not yet entirely ceased. In 1867-8 forest fires were successfully excluded from all Garhwal and from most of the Kumaun Forests."

Of the existing condition throughout this large area he wrote :

"Generally the second and third-class trees are in a most flourishing condition, and the entire rest which the forests have enjoyed since they were shut up has borne marked fruit in their improvement. This result is best seen in those forests which were partially but not too heavily worked in past years.

The growth of the young trees and saplings in almost every case is most satisfactory, and is a standing proof of the immense benefit that has been effected by the removal of the cattle and the exclusion of fires ; when one looks at thriving young trees of every size, from the smallest seedlings to the young giants of 50 or 60 feet in height and 2 feet in girth, growing up with fine clean barks and straight stems, and all full of the highest promise, the mind is filled with good hope that future ages will see these valleys and plateaux covered with forests far greater in value to those that went before them, inasmuch as they will benefit by regular protection and conservancy, which their predecessors did not enjoy. Indeed, the virgin forests which actually exist are by no means the best ones we have." That this prophecy is in process of being fulfilled, as the result of the untiring care of a scientifically trained staff, a visit to these areas at the present day will amply demonstrate. Pearson continued :

"The only portion of the forests which can be looked on as forming an exception to the above, are those in which, from being overworked, the grass has got to such a head that it chokes the ground entirely, and renders it impossible for the seed to germinate. It is very difficult to know how to act here, as, in order to do any good, the huge grass must be got rid of. It is to be hoped that if fires can be effectually excluded for a number of years, it will wither and die, as there are in most cases still quite sufficient old trees on the ground to furnish seed, if only the grass could be removed and the ground cleared."

As regards the future yield from the Forests he classified it into (1) the yield from the regular annual fellings, (2) the yield from the conservancy operations (i.e. thinnings). The first

would be based on a regular working plan, and enumerations of the growing stock were to be taken in hand at once. But Pearson thought he could safely commit himself to saying at once that he considered that Colonel Ramsay's estimate of one lakh (1,00,000) of cubic feet per annum from the forests of both divisions could be confidently reckoned on, in addition to amounts obtainable from the number of unsound trees and thinnings. The latter operation he regarded as a conservancy measure rather than a source of revenue. His silvicultural remarks on the sâl are of interest, when it is remembered that they were written in 1869 :

" I have now been in the habit of watching sâl forests for about ten years (Pearson it will be remembered had been Conservator in the Central Provinces where great sâl forests exist), and the inspection of these 'doons' very much confirms the opinion to which my mind has for some years been tending, viz., that both for the free germination of the seed, and the effectual reproduction of the forest, as well as for the welfare of the trees and their progress afterwards, sâl requires a considerable amount of sun and light ; and that a sâl forest will bear, and indeed repay (if it does not absolutely require), much more liberal felling than almost any other description of forest in India. Yet this felling must be carefully limited in such a degree that the grass and the scrub jungle should not get ahead instead of the young sâl ; for if it does, the latter will infallibly be choked and perish. It is impossible, however, to see any forest even where heavy felling has been carried on, provided sufficient cover has been left to prevent the coarser descriptions of grass getting hold of the ground, where the growing trees of all classes do not show a marked improvement in their appearance over those in forests which have never been touched. Moreover, for the actual free germination of the seed of the sâl tree, it is absolutely necessary to open the ground to the light and sun, a fact which the most cursory examination of a sâl forest will at once show.

In regard to the amount of felling which a sâl forest will bear with safety, I believe that in almost every case every sound first-class tree may be removed ; for where the second and third-class trees are abundant they protect each other ; and, where this is not the case, we may be sure that the forests are old, and that from 20 to 50 per cent of the trees are more or less unsound. The unsound trees are quite as good both for

seed-shedding and protective purposes as any others, and the proportion of them to be removed must depend on the ratio they bear in the forest to the sound ones. But every forest must be treated on its own merits; and, indeed, there are hardly any two portions of the same forest which will bear exactly the same amount of working.

For the above reasons, as well as on account of the immense benefit which accrues to young *sâl* from perfect rest, I am led to advocate a plan of working these; and, indeed, all *sâl* forests, the basis of which should be the division of the forest into blocks, each of which should be worked in succession to the full extent it will bear with safety, after which it should be shut up for a full period so as to allow the second-class trees to become first-class. As from seven to ten rings may be generally counted in one inch of the radius of a well-grown *sâl* tree, I am induced to think that this period may be estimated at from 30 to 40 years."

Pearson proposed to consolidate the good work commenced by Colonel Ramsay under the heads of:—

- "(1) The completion of a good and correct set of forest maps for the whole tract on a large scale.
- (2) The framing of a regular working plan of the forest.
- (3) The opening out and thinning of the virgin forests.
- (4) The gradual extension of the system of forest roads, especially in Kumaun.
- (5) The compilation of a proper record of the State rights in the forests, or 'Register of the Forests.'"

In concluding this remarkable Report he asked to be allowed even if, when expressed with reference to a superior officer, it might savour of presumption, to place on record how strongly he was impressed with the perfect system of management of the forests introduced by Colonel Ramsay, a system which after his own detailed and minute investigation had strongly impressed him.

"It would be difficult to overestimate the value of Colonel Ramsay's services to Government in these respects; indeed, it is, I believe, not too much to say that no officer who did not possess the local knowledge and influence which Colonel Ramsay brought to bear on the work could have effected so much in the same time. And after having been in the Forest Department myself for nearly nine years, and after having seen

something of the systems followed (not only by myself in the Central Provinces, also in the Madras Forests, in Bombay and in the Punjab), I would desire to testify that perhaps in no Forests in India has so much sound progress in Forest Conservancy been accomplished on so large a scale as has been effectually carried out in the sâl forests of Garhwal and Kumaun."

He also mentions Colonel Baugh, who was in actual charge of the conservancy arrangements and had had the work of turning out the cattle owners, a delicate task, and Mr. R. Thompson, who subsequently became well known in the Forest Department and was entrusted, it is believed, with the "shikar" arrangements for King Edward when he visited India as Prince of Wales.

Both the Government of India and the Secretary of State commented with lively appreciation on Pearson's high tribute to Colonel Ramsay's management of the Garhwal and Kumaun Forests.

The financial results and yield of the forests during the nine years of Colonel Ramsay's administration were summarised as follows by the Governor-General :

"The total financial results have been: Receipts, Rs.32,90,500; Charges, Rs.17,43,500; Surplus, Rs.15,47,000.

The Governor-General in Council deduces from the figures given in the Report that the area of the sâl forests of Kumaun and Garhwal may be estimated at about 1000 square miles. Adopting this figure, the gross revenue would appear to have amounted to Rs.3,290 per square mile in nine years, or Rs.365 annually; the charges to Rs.1,743 per square mile in nine years, or Rs.193 annually; the net revenue to Rs.1,547 per square mile in nine years, or Rs.172 annually. This amounts to about 4 annas per acre net revenue per annum. The yield in timber appears to have been 467 cubic feet per square mile annually, and the future estimated yield is 100 cubic feet per square mile of 640 acres.

This is a very small yield, and it is clear that the productiveness of the forests is capable of great improvement."

The Secretary of State considered that the net profit of nearly £155,000 was very satisfactory, especially as "Forest Conservancy had been established without at the same time creating discontent amongst the population." But he

expressed anxiety on some remarks made by Pearson concerning the efficiency of the method in use of cresoting the chir pine and other inferior timbers so as to render them serviceable for railway sleepers, and asked for a Report on the methods then in use. He added : " The question was some years since under the consideration of the Madras Government, and some processes have been very much used in this country, although very possibly their effects on the timber would not be so durable in India as in Europe." The Secretary of State at the time was the Duke of Argyll.

The Dun Forests.—Pearson's Report on the Dun Forests treated of the forests actually in the Dun and those on the Siwalik Range of hills to the south and the isolated patches of sâl forest outside the southern boundary of the Siwaliks. The two latter contained about 15,000 acres apiece. Of these the Puthree Forest, nearly south of Hurdwar, had been made over to the Rurki workshops, and the other further west, the Kheri plateau, had been joined on to the main Government forest.

The forests on the southern face of the Siwalik Range and at the foot of the hills Pearson characterised as exceedingly poor, containing little except "dhâk" (*Butea frondosa*), "bher" (*Zizyphus Jujuba*) and "oulah" (*Phyllanthus Emblica*) trees, "which may do for railway fuel, but for nothing else ; moreover, the soil is so arid and devoid of moisture that reproduction must be very slow, and though valuable as grazing lands they cannot be looked on as ever likely to be valuable as forests. Even the best and thickest portions of the jungle contain but little real wood at present, and promise but little in future." The upper ridges of the Siwaliks were covered with a fair quantity of "chir" (*P. longifolia*), though it was termed as indifferent in quality ; whilst the inner ravines contained small and stunted sâl trees. The material from this area might be utilisable as railway fuel and for local purposes, but Pearson said that these forests would never yield timber of large scantling size.

The forests on the north face of the Siwaliks were described as follows : " The main forests of the Siwalik Range to the north are nearly of pure sâl. They extend from the Ganges to the Jumna, and are here defined by a broad straight line cut through the jungle wherever no regular cart-road is available for the purpose. These lines, which mark the forests on both sides of the range, have been kept straight by judicious

exchanges, arranged by the Commissioner of Meerut with different private proprietors. Besides the cleared lines, the boundaries are marked by rows of 'seemul' (*Bombax malabaricum*) trees. These rows are formed by planting branches of the 'seemul' in the ground, as it readily takes root and throws out shoots, and in time becomes a stunted tree itself. Even in the present dry season two-thirds of the trees so planted have taken root, and I consider them to be practically one of the best forest boundaries I have seen."

From the above observations it is evident that Pearson did not regard the future of the Siwalik Forests as very promising, nor their value as very great. At the time his opinion would be inevitably influenced by the unavoidable comparison which the mind would make with the still extant fine tracts of virgin forest existing to the east, and with many forests in the Central Provinces which he had examined. But the true value of a forest area is chiefly dependent upon the locality in which it is to be found and the demands of the local population and their number. It was even then fully realised that the Dun Forests would always be valuable from this aspect alone, and that without strict conservation they would disappear. On the subject of the grazing the Government of India asked "under what circumstances and conditions pasture is permitted in the Dun Forests, and whether the herdsmen and the people of the surrounding villages have any prescriptive rights; if so an early opportunity should be taken to define these rights. Or if the State forests in the Dun are not encumbered with any such prescriptive rights, I am to enquire what measures have been taken to guard against the growth of fresh rights and privileges in regard to grazing. . . . It appears that Major Pearson wishes to make the attempt to keep fires out of the forests. This will certainly be found a difficult task, as long as cattle and herdsmen are allowed free access to the forests."

To the north of the Siwalik Range is situated a plateau of a mean elevation of 2000 feet and some 15 miles in breadth, having the Himalaya as its northern boundary. All the good sâl forests at this period were situated here. Pearson characterised the sâl in this area "as very level in character, of fair quality, but by no means first-rate. In the Central Provinces there is much sâl forest of the same description." He noted that the sâl was not pure but mixed, in places plentifully, with "sein" (*Terminalia tomentosa*) and other jungle

woods. These forests required thinning, and a good revenue would be realised from poles and firewood. But before the forests could be regularly and systematically worked it would be necessary to divide them into blocks, and this could be only done under the supervision of a Forest Officer. For this reason he had applied for a second Assistant Conservator of Forests for the Dun. It would be essential to put a stop to "the present evil system of granting passes to persons to cut timber within the Government forests."

In the Western Dun there remained three Government forests, Dholecote, Chandpur and Umbari, the greater portion of the rest of the area having been given away in grants. These forests had been completely worked out and contained saplings of about fifteen years only. Pearson considered that these forests would become very valuable in the future, but they required thinning. They were very compact and would be easily managed. At the time they were very dense and impenetrable, and he had ordered lines to be cut at right angles through them to divide them into rectangular blocks. This material he proposed to supply to the merchants whose passes were to be stopped.

In the Eastern Dun the principal sâl forest was that of Nawadah Hill, about twenty square miles in extent. This forest had been exploited of all fellable timber. It varied in character, being very good at the end of the hill and at its foot where the young sâl growth was vigorous; in other parts the forest was mixed, whilst along the south face the sâl was crooked and small. The same procedure was to be applied as laid down for the western forests. The remainder of the Eastern Dun down to the Ganges was a dense jungle with belts of sâl running through it, some of excellent quality. There were also, especially along the Ganges and on the islands, extensive belts of "sissoo" and other trees which would supply a large amount of railway fuel and small wood for other purposes and "eventually, no doubt, much valuable timber."

Summing up his Report he said that the forests of the Dun would not yield timber for many years to come. The thinnings which it would be necessary to make in them would, however, yield a large amount of material for railway fuel and the local requirements. Owing to their accessibility and the demand for material he proposed to start systematic working at once. Only the outer boundary demarcation work had so far been done. The true conservancy work remained to be commenced

In addition the question of planting up some of the large grass areas and "jheels" (marshes) in the Eastern Dun had been under consideration in order to reduce the risk of the serious fires which were common in that part. It would not be possible to stop grazing at present, and Pearson did not consider it harmful as most of the areas were too far advanced to sustain injury from cattle. But, he added, the value of the Dun Forests would not become apparent until the main lines of roads projected by the Commissioner of Meerut were built, both inside in the Dun and outside in the plains. He proposed to commence at once working outwards from the Mohun Pass road, both east and west. But he did not anticipate that funds would be available until the Bhagaruttee Valley road was completed. The Conservator pointed out that even one mile of cart-road completed through the forest on either side of the road through the pass and at right-angles to it would enable a large amount of poles, bamboos, etc., to be brought out, which would find a ready sale to supply the urgent wants of the population.

The Bhagaruttee Forests.—The Conservator had made a tour through the Bhagaruttee Forests in 1868. In the following year Mr. Grant was sent to make a survey of the forests, to divide them into blocks, bounded by natural features, and to make valuation surveys in order to ascertain the amount of deodar present. The valuation lines, 2 chains in breadth, were carried through the forests wherever possible; the trees on these lines were carefully counted, the sound being distinguished from the unsound. These enumerated lines were entered on the maps and averages struck for the whole block. These forests though distant proved very valuable. The valley is about 16–17 miles in length, the deodar forest lying between the village of Jhala and Gungootree. The deodar extended for $2\frac{1}{2}$ miles above the latter place, but was stunted; and the blue pine for 8 miles above Gungootree, the birch taking its place right up to the glacier. The forest was divided into nine blocks—Gungootree, Neelung, Goomgoom, Hirseel, and on the south side of the river, Tailgurree, Sartee, Doodoogad, Dinargad and Kida Gunga. Some of the finest trees in the whole area were in the Gungootree block, several measuring 16 feet girth and upwards, with a height of 100 to 200 feet. The more accessible parts of the area had been worked in the past, in some cases heavily, and much destruction had been done by cultivation and cultivators, especially those

practising "kheel," or shifting cultivation, which even the upper regions of the great Himalayan Mountains were not immune from. On the upper slopes destruction had been caused by avalanches which had cut great lanes through the forest. In areas so devastated it was noticed that no young deodar or other trees were to be seen coming up. The forests were very exposed, the climate very cold and the growth consequently very slow; moreover, in the valley there was only about $5\frac{1}{2}$ hours' sunlight a day owing to the great height of the mountains. Pearson considered that eight rings to the inch represented a fair average of the rate of growth of the forests, or about 200 years for a tree of 2 feet in diameter. Many stumps with 400 to 500 rings were counted. The plan of felling in lines, leaving intervening lines of unfelled trees, carried out elsewhere, would not do here owing to the exposure, and Pearson proposed selecting as many sound first-class trees from the area as it would stand, leaving the rest as shelter to the younger trees and then closing the forest absolutely. There was little sheep-grazing in the forest, and the Conservator considered that even with the expense of the Bhagaruttee Valley road, the Government would make a handsome thing out of the lease of this forest from the Tehri Rajah. It formed a portion only of the forests thus leased.

On Grant's Report the Government of India remarked that it was "the first attempt at determining the quantity of the growing stock of timber in the different sub-divisions of an extensive forest region in the North-West Provinces."

The importance attached to the Bhagaruttee Forest at this juncture was due to the fact that it was expected to yield a large proportion of the timber and sleepers required for the Rajputana State Railway. The area of forest on the main river was considered to be 11,490 acres, estimated to contain 116,711 first-class trees, one-fourth of this number being believed to be unsound. The forests of the Neelung Valley were not included, as they had not yet been surveyed and valued. The survey also showed that there was a large proportion of trees of the second and third classes and in some parts a satisfactory number of younger trees. It was anticipated that there would be no difficulty in supplying during the next five years the amount of timber which had been scheduled for extraction from this area. A part of it was to come from the large quantity of dried timber which existed in some parts, especially in the areas which had been partly felled and partly

killed by "kheel" cultivation. Pearson laid down the following principles of management :

(1) To utilise the dead trees and felled timber, wherever possible, throughout the forest.

(2) To confine his fellings at first to certain limited and well-defined portions of the four western blocks.

(3) In the tracts selected for felling, to remove as many of the sound first-class trees as could be taken without exposing the younger trees on the ground to the severe climatic conditions.

(4) To close all tracts as soon as the work in them was completed.

The Jaunsar-Bawar Forests.—These forests are situated in the Himalaya between the Native States under the Simla Agency and the Rajah of Tehri-Garwhal's territory ; they cover the lower spurs of the great range which separates the Jumna from the Tons River and culminates in the peaks above Jumnootri. There was also a tract to the west of the Tons containing some valuable forests, partly owned by the British and partly in the petty State of Taroche. It had been suggested at this period that the portion of these forests owned by the British should be given up to Taroche. Pearson, however, contended that these forests were very valuable and deprecated their alienation. Brandis had already inspected a part of this area in 1863. Pearson's Report had reference to the whole area and was in much greater detail.

He first alluded to the forests on Deoban Hill (9000 feet) as follows :

"The Deoban Hill is a prominent feature of the main range. The forests are important, as being situated close to the new cantonment of Chakrata, and from them the main supply of fuel and common building timber must be drawn. Only a few patches of deodar are found on the hill itself, chiefly scattered on the north-west side, but the south and east faces are well clothed with oak, chiefly *ban* with *moru*, which will need careful protection, and on the top of the hill there is a magnificent forest of *kharsu* oaks. Below this, but near the summit, on the spurs which run down from the north-west and west flank, the spruce fir is found in great abundance, mixed with silver fir, which both show fair development. These forests, with proper care, should go far to supply the ordinary wants of the new cantonments." . . . "The Deoban Forests are chiefly

valuable from their proximity to the new cantonment. It is believed that, with proper arrangements, the supply of fuel and ordinary building wood may suffice for the wants of the new cantonment : but no care must be spared to economise the available resources of the forests and, by opening out roads and mule-tracks, to bring into use the wood on the more distant ridges, while that in the immediate neighbourhood of the cantonment is protected. To this end the Simla Road, which runs along the south side of the Deoban Hill, should be completed as soon as possible as far as the Lokundee Ghát, or even to the Tons, when mule-tracks can be opened by the Forest Department from the various ridges to join it. Tracks must also be cut round the north side of the same hill by Kotee, and so along the ridge to Chakrata, so as to open all the forests on the other side of it.

The lime works of the Public Works Department have been removed further off cantonments than they were at first, that the ravines nearest to the station may be made available under proper restrictions for residents to obtain their fuel from. As far as possible, every endeavour has been made to provide for the convenience of the cantonment and its residents, while the natural beauty of the hills and ravines will not be destroyed by the removal of all the trees on them. I believe that the requirements of the new station will necessitate that the Deoban Hill be made a third-class forest, in which grazing will be permitted, but where wood cannot be cut except under proper restrictions."

Omitting the forest to west of the Tons and Deoban, Pearson classified the rest of the forests of the area in question into nine—Bodyar, Mushuk (Mashak), Kotee, Kyoloe, Lokwa, Totwa, Jako, Chejal and Kotee and Bastil.

The Bodyar Forest had been worked out. All the trees for the erection of the Chakrata barracks had been felled here—about 1400 in number at that time—and 400 others had been girdled (which Pearson said was a mistake : Brandis had evidently introduced the system from Burma) and stood withered but not killed. The forest had been heavily felled in before it came into Government hands, and the new fellings Pearson considered were above its capacity. However, he thought that as soon as the present fellings were finished and the forest closed it would quickly recover. The forest was nearly pure deodar, and the conditions for the growth of this

tree ideal. The site was a compact basin or valley, horseshoe in shape, the soil conditions excellent and in some parts "thousands upon thousands of young deodar seedlings may be seen coming up literally as thick as corn in a field." Sheep were the great enemy then, as they eat down the seedlings. Brandis had made several surveys here and gave seventy years as the age of a first-class tree. Pearson was inclined to think it even less, as he had counted many stumps of two feet in diameter which showed only 50-60 rings. The grave drawback in the forest at the time was the great number of terraced fields belonging to the village of Lohari scattered in the ravines of the forest. Pearson hoped to be able to get rid of these by compensation or purchase as, he added, "if the forest were once in sole possession of the Department, I am sure, with a little aid in the way of sowing seed, the whole basin might be filled with such a forest as perhaps the whole of the Himalaya could not show." It is impossible here to deal in detail with the rest of the forests of this area. Pearson estimated the contents of first and second-class trees in the forests as follows :

	1st Class.	2nd Class.
I. Bodyar . . .	—	—
II. Mushuk . . .	1,500	1,500
III. Kotee . . .	1,500	1,000
IV. Kyoleo . . .	3,000	3,500
V. Lokwa . . .	} 20,000	21,000
VI. Totwa . . .		
VII. Jako . . .	2,500	3,000
VIII. Chejal . . .	2,500	2,500
IX. Kotee and Bastel .	3,000	5,000
Total . . .	34,000	37,500

"This may, I think, be taken as a moderate estimate, as Dr. Brandis estimated 40,000 first-class trees, but he had not the same opportunity for a critical examination as I had, and in the absence of any certain statistics I would prefer to be rather under than over the mark. There is no doubt that the whole country is most prolific of deodar, and if it were possible to carry out conservation thoroughly everywhere, it might be converted into one vast deodar forest."

Until within the last few years the people, both of the hills and the neighbouring plains, had been able to cut any wood they required in these forests and carry it out. Totwa and Mashak had suffered severely from this practice. Pearson proposed the introduction of the following rules :

" 1st. That all people who have deodar in their village forests should of course get it, and that it should be given gratis also for *their own wants* to those who formerly had it in their forests, but from whom the forests have been taken away to form State reserves.

2nd. That those who neither have deodar in their forests nor ever had any, must use other wood, such as fir or oak, which they may have gratis ; but if they require deodar they must pay for it at the rate of one-fourth the average selling price of deodar in the Division. This was the rule in the Central Provinces with regard to teak, and worked well, as it checked its being used except when absolutely required.

3rd. Artisans and timber dealers of all sorts must pay the full price for deodar.

4th. But no villager in Jaunsar must sell wood of any sort without distinct permission from the Forest Officer, even though it be from his own village forests."

In view of the subsequent importance and value which these forests have achieved, although it is impossible to follow Pearson seriatim through his Report, it will be useful and interesting to reproduce parts of the Memorandum on it drawn up by the Secretary to Government (P.W.D.) of the North-West Provinces. (No. 198F, dated 29th June, 1869.)

"The wants of Chakrata may apparently be supplied in great part from the Bodyar Forests before all the first-class trees, which may be cut without injury to future production, are exhausted, and the remainder from the Mashak Forest. In the Kotee and other forests it is no doubt necessary for their preservation to exclude cultivation, and the question of doing so should be carefully considered. The destruction of the beautiful silver fir forest above Kotee should be avoided if possible ; and it may be hoped that it will be rendered unnecessary by securing the complete reserve of the existing deodar forests. The forests about the Dharagad will afford ample stores of timber for the present, and admit of the market being well supplied for the next ten or twelve years.

The trans-Tons tracts are shown to be highly valuable

tree ideal. The site was a compact basin or valley, horseshoe in shape, the soil conditions excellent and in some parts "thousands upon thousands of young deodar seedlings may be seen coming up literally as thick as corn in a field." Sheep were the great enemy then, as they eat down the seedlings. Brandis had made several surveys here and gave seventy years as the age of a first-class tree. Pearson was inclined to think it even less, as he had counted many stumps of two feet in diameter which showed only 50-60 rings. The grave drawback in the forest at the time was the great number of terraced fields belonging to the village of Lohari scattered in the ravines of the forest. Pearson hoped to be able to get rid of these by compensation or purchase as, he added, "if the forest were once in sole possession of the Department, I am sure, with a little aid in the way of sowing seed, the whole basin might be filled with such a forest as perhaps the whole of the Himalaya could not show." It is impossible here to deal in detail with the rest of the forests of this area. Pearson estimated the contents of first and second-class trees in the forests as follows :

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compensation; and, under the circumstances, His Honour thinks that this must be done by voluntary bargain and negotiation, which should be conducted through a Civil Officer of the district. There are no details as to the number or area of these occupied tracts, nor any estimate of the expenditure that would be required to eliminate the intruders. Until some estimate on these heads be given, it cannot be judged whether the inconvenience and hardship by eviction would be justified, and the cost of compensation repaid by the public advantage anticipated from closing the forests. The subject will be referred for consideration to the General Department of this Government. If an officer of the settlement staff could be spared it would, in His Honour's opinion, be desirable to depute him to determine these points in communication with an officer of the Forest Department. Mr. Cornwall is said to be eminently qualified for the duty; but before any determination is come to on this point, further report will be awaited in the Revenue Department. Meanwhile, it is admitted with the Conservator that it is extremely desirable to have these valuable forests in distinct and self-contained blocks, each thoroughly cleared of private rights of every kind.

II. The open Government forests would be all other forests which it may not be expedient or possible at present to close. These will be open to grazing and fuel demands as heretofore; but the cutting of timber must be prohibited, except under sanction of the Forest Department, which might take a general form by declaring certain classes of wood as free to be cut, no other trees being touched but by express permission. There is no occasion to require an annual application for the privilege of grazing; the rights of Government are well understood. These forests should also be distinctly marked off.

III. The remaining forests would be at the disposal of the villagers; with this condition, that they are free to cut what is required for domestic uses, but not to sell nor dispose of any timber to strangers.

His Honour is of opinion that the above plan, by which the forest tracts defined as Nos. I and II will alone be marked off, is preferable to marking off the entire village forests. It would still be in the power of Government to add to the areas of Nos. I and II, for good reasons, on condition that satisfactory provision was made for village requirements.

The rules proposed by the Conservator, at the close of this Report, are just and conformable to the rights and customs of

the people ; but His Honour considers that Major Pearson is mistaken in expecting that there will be little pressure for cultivating holdings in consequence of the Chakrata cantonment ; on the contrary, His Honour anticipates a large increase, and desires that the Forest Department should make its arrangements in expectation of such pressure.

It is noted with satisfaction that the temporary cultivation (*kheel*), on the Kyoloe Hill has been put a stop to for some years. It should continue to be carefully suppressed.

The necessity for the construction of roads, slides, etc., for facilitating transport of the produce from the forests cannot be doubted. It will be the business of the Forest Officers to carry out these works. Already a small grant has been made for constructing mule-tracks during the present year from the Deoban Forests, and it will be the duty of the Conservator year by year to bring forward a scheme of operations with this end ; and to propose the requisite Budget provision. An estimate should be framed as soon as practicable for forming the road described as passing by the Karama Peak to the Jako Forest.

The proposed order in which the forests are to be worked seems to be that required by their present state ; and the special arrangements for supply of wood to Chakrata are approved. On receipt of the estimate for the completion of the Simla Road, as far as the Tons, which the Conservator has promised to furnish, it will be considered whether the Government of India should be asked to make a grant from the general funds of the State for the benefit of the residents of the cantonment in facilitating supply of fuel, etc., or whether the cost should be borne by the Forest Department, and eventually recovered in the price of fuel."

DEODAR FORESTS AT THE HEAD OF THE JUMNA AND TONS RIVERS

Pearson's investigation of the forests at the head of the Jumna and Tons Rivers materially altered his views on the subject of the locality in which he would commence his felling operations for the supply of the sleepers required for the Rajputana Railway. As an outcome of his visit he at once proposed to transfer his projected fellings in the Jaunsar Forests to the forests of the area now to be discussed. He well

describes the topography of this somewhat complicated mountain region.

"It will be seen that three main ridges spring out of the block of snowy mountains, of which Bunderponch is the main feature. The first of these separates the Ganges from the Jumna, of which the last distinctive feature is Nagtiba, opposite Mussoorie; the second range separates the Jumna from the Tons, and may be said to extend as far as Deoban; and the third separates the Tons from the Pabur, and, indeed, is a branch of the main range which divides the Sutlej from the group of rivers south of it. All these ranges are well covered with fine forests of firs and oak; but the Ganges and Jumna Range is only deodar bearing in a few special localities; the Jumna and Tons Range only becomes so about its lower extremity near Deoban, where it contains our Jaunsar-Bawar Forest (already described); but the last or Tons and Pabur Range seems to have deodar as its characteristic tree from the point where vegetation commences below the snow-line."

It will be remembered that Cleghorn visited a portion of the lower parts of the forests on the Tons, Rupin and Pabur in 1862 (I, p. 406), and that O'Callaghan surveyed and reported on parts of them in 1865. Pearson's investigations showed that these forests were much richer in deodar than any of the above Reports had anticipated, and he also drew attention to the great tract of "chir" (*Pinus longifolia*) forests which existed on the Jumna and Tons. It had been laid down that it would be necessary to fell 15,000 deodar trees a year in the forests of the North-West Provinces in order to supply the demands of the railway for sleepers during the next few years. Half of this amount was to be derived from the Bhagaruttee Forests and the other half Pearson now proposed to obtain from the Tons and Jumna Forests, postponing fellings in the Jaunsar Forests for the present. It is impossible to deal with his Report in detail, but it may be shortly summarised as follows:

Commencing from the Ganges a considerable deodar forest (No. 1) existed above Barahat near Suldo. This had been worked out. One of the finest *moru* oak forests he had seen existed above Upreekot. Down below in the valley a small deodar forest above Shalna had been much cut into by the local people. It was worth preserving. Small patches to the south (Bonk Peak and Nagtiba Hills) were too inaccessible at



LOOKING UP THE TONS RIVER FROM PHADIAK. THE FOREST ON THE LOWER SLOPES OF THE HILLS IS CHIR PINE (*Pinus longifolia*). THE HILLS IN THE BACKGROUND ARE CLOTHED WITH DEODAR
Photograph by W. and Mrs. King James, F.C.S.



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On the range between the Tons and the Pabur deodar forest was the distinctive characteristic. The main blocks of forest here extended from just below Gungar to about 2 miles below and opposite to Datmir (No. 6), and on the further side of the range above Leor and opposite Kahsole and Ruksha (No. 7). All this timber could be readily got into the river. Pearson estimated that there were not less than 10,000 to 12,000 trees available in this range. As regards the floating capabilities of the Tons above its junction with the Rupin at Naintwar, he did not think there would be any difficulties. Mr. Wilson had already floated timber down from Datmir; there was a fall in the river of nearly 2500 feet between Datmir and Naintwar, or nearly 100 feet per mile. The only existing impediment in the bed appeared to be for a short distance above Shankree.

Lower down he estimated that 3000 trees could be obtained from the forest near the village of Koarbo (No. 9), and in a forest to the west of this village (No. 10).

On the Rupin, near its junction with the Tons, there were three deodar forests from which he expected to obtain 6000 trees and another 4000 trees on the right bank of the Rupin on the slopes of the Kandighat Hill and neighbourhood (Nos. 13, 14), the latter forest containing also blue pine and silver fir. Leaving the Rupin and rounding the spur of the Taroo an area of forest, in a large basin formed by several streams, which may be termed the Lambatach Forests, was examined. The forests here (Nos. 15 and 16) contained some fine deodar, especially the Motwargad and Koneegad (No. 15) which contained very fine deodar; but without a more detailed inspection Pearson was diffident on the subject of the possibility of extracting the timber, in spite of the villagers' assurances that it could be done. He estimated that there were probably some 10,000 trees in this area. At the point where the road from the Tons to the Pabur crosses the intervening ridge a very fine deodar forest on both sides of the ridge (Nos. 17 and 18) commenced, equal, Pearson considered, to the best of the Jaunsar Forests. The forest was not quite pure; it was finest and purest to the east of the ridge. Here six trees measured gave the following girths: 15 feet 3 inches, 16 feet 10 inches, 11 feet 8 inches, 13 feet 9 inches, 12 feet 3 inches and 17 feet 4 inches. All were well over 100 feet in height. Continuing round the Lambatach a considerable amount of deodar was observed (No. 19) mixed with blue pine above the Bamsu village; and on the opposite side (west) of

the Lambatach peak were two other forests of some extent (Nos. 20, 21). On the south side of the Lambatach Hill a fine well-stocked deodar forest existed (No. 22) 3 miles in length by half a mile deep overhanging the Tons, which, said Pearson, "will be a most valuable addition to our stock of timber." The Mundhole Forest (No. 23) west of the Tons he did not include in his calculations, regarding it as too high to work at the time ; moreover, the lower part of the valley was full of cultivation.

Pearson estimated that the forests between the Rupin and the Pabur (Nos. 15 and 22) could not contain less than 25,000 trees. One-third of these would be at once available. If all the blocks of the Upper Tons were added together they probably contained at least 50,000 first-class trees, of which one-third could be worked cheaply and easily, as the forests were not too far from the river and overhung it ; whilst the Jaunsar Forests were fully 4-12 miles distant from the river. Therefore he proposed to remove the sleeper work from the Jaunsar Forests to the Tons for the present, "and obviate the inconvenience of the sleeper work competing for labour so directly with the Chakrata works, which is a most important point." A wise provision which every Forest Officer will thoroughly appreciate.

Pearson concluded his Report as follows :

"I propose, then, at once to direct Captain Murray to fell 5000 trees in blocks Nos. 6, 8, 9, 10 and 22, and perhaps in Nos. 17, 18 and 23, after more examination of the ground. Mr. Bagshawe may look after this work at once.

Captain Murray will also be directed to saw up at once about 2000 sleepers, to be ready to put into the river in April, when it first rises, when 300 or 400 logs will be also put into the river ; and after an actual experiment a decision will be finally come to whether the logs should be sawn up into sleepers in the valley or below in the Dun. Experiments will also be made in bringing down both timber and sleepers from different parts of the forests, as to cost and practicability ; also in sawing up, both on the hills and in the river.

The above arrangement will enable Captain Murray by degrees to open out the mule tracts in the Jaunsar Forests, and to make slides and otherwise prepare these forests for working hereafter. It is hoped, therefore, that it may meet approval.

I believe from enquiries that, if 15,000 or 20,000 logs can be got down into the river, there would be no difficulty at all

in sawing up a *lakh* (1,00,000) of *sleepers per annum* in these forests. I would therefore not be in too much of a hurry to commence sawing up too many sleepers before they are wanted as they are sure to split and deteriorate more or less in a couple of years.

Something will have to be done to make the road practicable up the Tons as a *footpath*; and one or two wire rope bridges must be put up in places to render the forest more accessible, as the only way at present of crossing the river between Mundhole and Naintwar is by being slung in a noose under a rope, and being dragged across.

As the whole of the forests of deodar north of the Tons are in the Tehri Rajah's country, Government may be congratulated in having got a much better bargain out of the lease of his forest than has been heretofore supposed."

A comment by the Government of India merits reproduction. Alluding to the fact that Pearson anticipated no difficulties in supplying the railways from these forests, the Governor-General suggested that it would be necessary to guard against too sanguine a view being taken of their resources. He was however, ready to sanction all needful funds for the construction of roads and erection of bridges to open out the forests.

The Forests of the Jhansi Division.—Pearson's last Report of the series was on the plains forests of the Jhansi Division Jaloun, Jhansi and Lalitpur. These had already been reported on by Webber in 1866. The latter's Report, in its main details reproduced the condition of these forests with accuracy; but some of his suppositions and proposals were not accepted by Pearson.

The problem confronting the Department in this region was how to make the forests at least cover the cost of conservancy. Pearson at once disposed of the idea of its being possible to appoint an Assistant Conservator to take charge, although in the future he contemplated transferring one of the two officers in the Dun to Jhansi.

The areas reserved in Jaloun were mainly grass areas, but they were important and could be probably eventually planted up to some extent.

In Jhansi the Government forests extended over 23,136 acres, the main part being the Bubeena Forest situated along the Betwa River. The forests of Jhansi were similar in

character to those existing on the whole of the northern slope of the Vindhya Range, from the Kuttra Pass in Mirzapur to the jungles of Bang-Tanda and Chikalda 100 miles west of Indore, bordering on Guzerat. Teak and bamboos were found along the banks of rivers and nullahs, and elsewhere "dhâk" (*Butea frondosa*), "mowah" (*Bassia latifolia*), "khair," "reunga" (*Acacia leucoplaea*) and scrub bushes of prickly acacias.

The following note by Pearson is of interest :

"I must differ from Mr. Webber's Report on the Jhansi Forests in regard to the question whether true forests ever existed in the Jhansi Division, as he supposes that such was the case, and that they have been destroyed; no doubt they never have had a fair chance given them, for the reckless cutting and burning of the jungle for *dhya* cultivation, which has been practised by the jungle tribes here, as elsewhere in every part of Central India, has utterly prevented the formation of a coat of vegetable mould in which a forest could grow; but from long and extended opportunities of observation I am convinced that it is an error to suppose that good timber of any size *was ever produced* on the north slope of the Vindhya. I cannot say that I have ever seen a single indication of a true forest along the whole of the range, and all natural elements for the production of good timber of any size are certainly wanting. Teak is found in places all along the range; and where it has been protected (as is the case in some parts of Punnah, north of Damoh, in some small zemindaries north of Saugor, especially in the forfeited State of Shahgurrh, and, I believe, also in Orcha) building timber of moderate size may still be obtained; and I have even seen some beams of large size in the old Shahgurrh and Ratgurrh Forts, which, no doubt, were cut in favourable localities of these hills. In Saugor and Damoh, since the order was issued forbidding it being cut in 1858, it has made considerable progress; but, nevertheless, I believe I am right in saying that these arid rocks are *not calculated to produce forests*, and that, *as a rule, they never have existed on them*, and that the jungle *has always been as now, a miserable scrub*."

Webber had recommended the formation of plantations in Jhansi. In 1864-5 the revenue amounted to Rs.2,922 and the expenditure Rs.988, leaving a surplus of Rs.2,000. To undertake the plantation work the establishment was largely

increased, resulting in a heavy annual deficit. The Deputy Commissioner (Mr. Lang) was not satisfied with the plantations and asked Pearson to visit them. They were in effect merely nurseries, the plants never having been transplanted. About 2 acres had been fenced in each forest district and sown with seed of teak, "mowah," "sissoo" and "babul" in holes about a yard apart. It was intended that the seedlings should be transplanted into the neighbouring forests. For various reasons, owing chiefly to the difficulty of watering them, this had not been done, and the areas were now choked with long grass and were a total failure. The large staff of peons entertained to look after them, in the absence of all personal supervision, which the Deputy Commissioner naturally had not the time or probably the knowledge to give, had done nothing and the experiment was a total failure. Pearson recommended that it should be given up and the extra staff dispersed. As he rightly said, plantations can never be carried on successfully in a rough way; if they are made at all they must be worked on a proper organised system. Until it was possible to appoint an officer to the division such work should not be contemplated.

In Lalitpur the Government owned about 100,000 acres of forest, the greater proportion of which had already been properly demarcated. The main portion lay along the Betwa River. *Dhya* cultivation had been mainly responsible for the destruction of the forests in this district and it still prevailed even in the Government forests. It had, said Pearson, been everywhere put down in the Central Provinces and there should be no greater difficulty in suppressing it here.

Summarising the Report, Pearson estimated the net annual income from the Jaloun Forests at Rs.1,500. He did not expect much revenue from the Jhansi Forests. But the Government of India were of opinion that both teak and bamboos (see Webber's Report, p. 298) might prove remunerative if taken care of, and agreed to the Conservator's suggestion that attempts on a small scale should be made to keep out fires. In Lalitpur the Conservator only anticipated a net annual revenue of Rs.2,500 which was considered very small for so large an area. The Conservator proposed to confine his attention to the protection of the best teak areas. The Government of India, taking a longer view and being without the almost inevitable bias which, with Pearson's experience of other fine forests, must have influenced his proposals, demurred, saying that bamboo forests should be included and that

"conservancy, as far as the rules provide, should not be given up in any portion of these forests." The Governor-General's review concluded :

"It appears to him that, in these dry hills of the Vindhya Range, the vegetation of which has been so well described by the Conservator, the value of Government forests should not be underrated. Whatever is now done in a really useful manner for the protection and improvement of these lands, so as to encourage the growth of grass, bamboos and useful trees, will repay itself abundantly in various ways. The attention of His Excellency in Council has been drawn to the rules, which are recorded in the Proceedings of the North-West Government for April, 1868, Nos. 28 and 33. These rules are not mentioned by Major Pearson, and I am directed to enquire whether they are still in force in the Jhansi and Lalitpur Districts. They seem to provide for an efficient protection of the Government forests."

Pearson's Annual Report of his Department for 1869-70 gives ample evidence of the order which he was introducing into the conservancy of the forests of the Province. The document is a much nearer approach to modern Annual Reports of the Forest Administration in India than any of its predecessors could pretend to, either in the North-West or the majority of the other provinces in India. The Resolution of the Lieutenant-Governor of the provinces upon the Report summarises the work carried out and forms a fitting termination to the period here under review.

"The Report contains a general retrospect of the operations and results as to the conservancy and finance of the whole Department, which was noticed to be wanting in that for the previous year.

The operations for 1868-9 resulted financially in a net revenue of Rs.2,41,611, which was slightly less than the estimate, Rs.2,44,813.

The estimates for the year under review included the Canal Plantations, which have since been again severed from the Forest Department.

Excluding the items belonging to these plantations, it appears that the revenue has risen from Rs.5,59,196 in 1868-9, to Rs.6,48,359, or 16 per cent, while the expenditure has

increased from Rs.3,72,007 to Rs.3,85,145, or rather over $3\frac{1}{2}$ per cent, the effect on the net revenue being an increase from Rs.1,87,189 to Rs.2,63,214, or nearly 40 per cent.

Marked improvement is shown in most of the divisions under the heading 'Minor Produce.'

In addition to the increase in money receipts, the value of the stock of timber on hand was increased during the year from Rs.67,674 to Rs.1,60,888.

Receipts.—As compared with the Regular Estimate for the year the receipts show an aggregate increase of Rs.72,412 under all heads, excepting V and VI, which show a decrease of Rs.1,251 and Rs.21,600 respectively.

The decrease in grazing fees, head V, occurred in the Dun. That under head VI, namely, in 'Sale of Fruits and Minor Produce,' amounted in Garhwal to Rs.20,187, and in the Dun to Rs.13,869, but with counterbalancing increases elsewhere. These fallings off, however, the Conservator has stated, in reply to enquiry made, he believes to be apparent only, and due to differences of classification under the several minor heads, and he has directed the Divisional Officers to be in future more particular in this respect.

Expenditure.—This was below the estimate under most heads, and where it was not so the reasons given are clear and sufficient.

Under head VII, 'Plantations,' the expenditure was only Rs.2,031 against estimate of Rs.6,360. The Conservator, it is understood, considered it useless to attempt any plantation work on a small scale, and what was done in that way was confined to making a commencement at Raneekhet of the introduction of Australian gum and other kinds of trees.

Under head X 'Communications' there was short expenditure of Rs.27,001, due to no officer being available till late in the season to superintend the works.

Dun Division.—It was said, in reviewing last year's Report, that with the roads which had been cut in the Dun it might be expected that arrangements would be made resulting in considerable increase to the proceeds from minor produce. The present Report shows a slight increase to the proceeds from minor produce, and also a slight increase if all heads be taken together; but there seems strong evidence of great corruption having prevailed among the subordinate Forest Establishments, which is at present the subject of criminal proceedings in the courts of the district. The result of these is looked for shortly.

There is no doubt much has yet to be done in this division to bring matters into a proper state of order, and it is expected that a good deal may be effected towards this by co-operation between the Commissioner of the division and the Conservator during the cold weather. The question adverted to in paragraph 8 of the Report, namely, of clearing and draining the centre of the Eastern Dun, was discussed when His Honour the Lieutenant-Governor was in the Dun. There is much to be said in favour of it, and the attention of the Commissioner and Conservator will be drawn to the subject during their approaching tour of duty together in the Dun, and result reported hereafter.

The contraction of the extent of operations for protecting the forests of Kumaun and Garhwal from fire is clearly necessary. On the important point of provision of pasturage for the settlers on the cleared lands along the forest boundary in Kumaun, the Conservator will be requested to consult with the Commissioner, and to submit the result of their joint deliberations.

The subject of collection of dry wood in the Kumaun and Garhwal Forests generally, requires probably further discussion and attention, which the Conservator will no doubt give.

Bhagaruttee Valley Road.—As regards the Bhagaruttee Road, it may be remarked that the works are now proceeding under an officer of the Public Works Department Establishment, Mr. Denmeade, and the testimony of the Conservator to the care and ability with which he is supervising them is satisfactory. With this it may be confidently expected that they will proceed as fast as is consistent with their economical execution.

Doorgadeh Road.—The Doorgadeh Road was quickly and skilfully made, and does great credit to Mr. Greig.

Sleepers Supply, Bhagaruttee Valley, etc.—The arrangements entered into with Mr. Wilson for supply of sleepers from the Bhagaruttee Valley give every promise of most satisfactory results. The difficulties mentioned by the Conservator have retarded progress in the Tons up to the present time, but the arrangements lately made, by which Mr. Greig has been placed in charge of this work, with an increase of staff to aid him, will, it may be hoped, soon result in a satisfactory organisation of work in these forests also. And this Government will be glad if the Government of India should accede to its recommendation

that sleepers of chir wood be tried in the Rajputana railways as well as of deodar wood.

Plantations about Raneekhet and Chakrata.—The way in which the young trees of Australian kinds have thriven at Raneekhet is gratifying; and His Honour the Lieutenant-Governor is glad to be able to mention here that the sanction of the Government of India has been received to the appointment of Mr. Crow, who has already done much to aid in the rearing of these young trees, to the charge of the contemplated plantations in and around Raneekhet for a term which will probably be long enough to see them well established and flourishing.

It has already been reported to the Government of India that it is not considered likely that any land will be found suited and available for the formation of plantations near Chakrata, and that there seems no reason why a plentiful supply of firewood for the troops and other residents there may not be obtained from the Dun Forests.

Plantations in the Plains.—The result of Mr. Colvin's examination of the *khadir* of the Ganges, mentioned in paragraph 18, has not yet been reported to Government, and it is requested that the result of his observations may now be submitted in a carefully recorded form."

CHAPTER X

THE INTRODUCTION OF FOREST CONSERVANCY INTO THE NORTH-WEST PROVINCES AND OUDH, 1865-1870 (*continued*)

CONSERVANCY IN OUDH

AT the beginning of the period under review Oudh had made greater progress in the introduction of Forest Conservancy and organisation than was the case in the North-West Provinces. Oudh was not then amalgamated with the latter provinces. It has been shown (I, p. 510) that Mr. F. Read was appointed Conservator of Forests in Oudh in 1861, and Captain E. S. Wood relieved the latter when he went home on furlough in February, 1864. The Secretary of State gave sanction to the appointment of an Assistant Conservator in Oudh in 1865. Brandis had visited Oudh in 1863 and had made a series of valuation surveys in the best stocked forests situated between the Sardah and Korially Rivers. As a result of Brandis' suggestions conservancy had been introduced on systematic lines; though the anticipated yield from the forests had not been attained by 1865.

In reviewing Wood's Progress Report for 1865-6 Cleghorn (Officiating Inspector-General of Forests) gave a brief résumé of the history of the Oudh Forests (I, p. 509).

The reserved forests had up to that date been confined to areas containing the three species *sâl*, "*sissu*" and "*tun*." Wood had reported that there were in addition grass lands within the forests and unculturable tracts containing miscellaneous forest produce which might with advantage be included. Sanction had been given during the year to the inclusion of the latter within the reserves. As regards the former the Chief Commissioner of Oudh had the matter under consideration. It was considered that as the regular survey was now entering these tracts the cost of demarcation would be small.

Works of improvement of the forests had been commenced, and one of the most urgent was the operations required to free

the sâl trees from the destructive elephant creeper, *Argyreia speciosa*. This is a mischievous type of climber. But still more dangerous is the giant creeper *Bauhinia vahlii*, which climbs over the highest sâl trees in the Terai, both species being often found upon the same tree. The latter is not specifically mentioned, but the operations were doubtless intended to cover both. Not infrequently it is necessary to cut and kill these creepers a year or two before fellings are made, since otherwise the crowns and upper parts of the stems are so interlaced with the stout strands of these creepers that the mere cutting through the base of a tree will not necessarily ensure its fall. A sum of Rs.9006 had been spent on this work during the year. As was rightly said this work was of urgent importance and must be carried out effectually, since the tightening hold of the creepers interfered with the development of the trees and the production of timber. In initiating purely sylvicultural and protective work of this kind it will become apparent that Oudh was ahead of most of the other provinces in India at the period. A further expenditure of Rs.18,500 would be required, and was proposed, to complete the work, at a cost of 4 annas per acre. The outlay was to be distributed over the ensuing few years. As an indication of how difficult it proved to forecast the cost of such a new class of work as this in the Indian forests, Brandis had estimated the cost at Rs.10-20 per square mile, whereas the actual expenditure amounted to Rs.160 per square mile. Wood proposed to carry out observations on the reproductive powers of the *Argyreia*.

The limit on the number of trees to be felled annually in the forests was 4000. This limit had been fixed by Brandis after his visit. The annual felling was to be determined by two considerations: (1) The natural yield of the forests; (2) the aggregate stock of timber in the Oudh and Nepal depots. On this subject Cleghorn wrote: "The price at which sâl timber in log is offered to the public in the Oudh Forests is 8 annas per cubic foot. In the vast forests beyond our frontier this wood is sold by the Nepalese at 6 annas per cubic foot, or Rs.8 per tree. If we are wasteful of our resources, the Maharajah of Nepal will raise his royalty, but by husbanding the forests and raising them to a high state of production, the entire demands of the market will be supplied, and the Nepalese seigniorage will remain reasonable as at present. The proposal to register the imports of timber from the Nepal Terai therefore seems to be judicious." The previous Forest Reports had been

drawn up for the Forest Year ending 30th September. At the desire of the Government of India the Reports were in future to be drafted for the financial year in order that they could be compared with the figures of other Administrations. The 1865-6 Report was so drafted. The operations therefore covered one year and seven months, during which period 5372 trees had been felled. The greater part of this timber was sold at Cawnpore and only a small portion at the depot on the Sardah River. The expenses of carrying the timber to Cawnpore were naturally greater, but the price realised was still higher in proportion and the results were very satisfactory. The Government of India wrote, however, on this transaction : " It remains to be seen whether it will always be convenient for the Forest Department to carry the timber for sale to Cawnpore." The prices then being charged at the depot were 8 annas per cubic foot for sâl logs, Rs.3.8 for sâl sleepers and Rs.2 for " sissu " planks. Outstandings of payments due were a feature of the Accounts in Oudh as elsewhere in Northern India, and it was strongly urged that these should be put an end to at the earliest possible moment. The Conservator was devoting himself to increasing the revenue from grazing and minor forest produce, and anticipated an increase of 20 per cent under these heads for the following year. A monopoly had existed in these matters, and Read's suggestion to subdivide the area of the 2nd and 3rd Divisions (there were three divisions in the Province, Khyrighur (Kheri), Baraich and Gonda) into compartments and sell the right of collection to the highest bidder had already been highly satisfactory. The question of village forests, valuation surveys and the opening out of forest roads are points of interest in Cleghorn's summary of the work being undertaken in Oudh.

" Village Forests.—Mr. Read recommends that all timber within forest limits should be considered reserved, and placed under departmental control. (This suggestion had been referred by the Chief Commissioner to all District Officers for their opinions.) He objects to the partially authorised entrance of villagers into the reserved forests for the purpose of obtaining timber for domestic purposes, and attaches much importance to the isolation of villages from reserved forest lands, after the plan followed in Kumaun, viz. the definition of limits by the excavation of a ditch, in lieu of boundary posts or pillars. These remarks contain matter for serious consideration.

This difficulty might be met, as proposed by Mr. Read, by assigning a tract of sufficient extent for the village consumption, and strictly reserving all the rest. The initiation of such measures is always attended with difficulty at first, but with persevering efforts and the careful explanation of the intentions of Government the object will be attained. An illustration of this is given by Mr. Read: 'On the introduction of the first step towards conservancy of the forests in Oudh, the felling of sâl saplings was strictly prohibited. The Tharoos at once declared they would leave their villages and go over to Nepal, as the straight sâl sapling was the only kind of wood they could use, and had hitherto used, for fencing their fields and roofing their numerous sheds and habitations; but I observe their villages are now as thickly populated as they then were, and their fences, etc., are constructed with less valuable timber than sâl.'

Valuation Surveys.—The importance of valuation surveys on the system proposed by Dr. Brandis is urged, in view to the compilation of statistics (enumeration of trees and measurements of growth) in the Conservator's office; this and the topographical survey being correctly considered as the basis of all Forest Conservancy.

Forest Roads.—The want of communications through the forest is dwelt upon in Mr. Read's Report thus: 'A point of considerable importance is the construction of roads through our forests, not only with a view of facilitating timber operations, but to assist the transit of timber from Nepal. I have ascertained that the average distance traversed by an ordinary timber cart is scarcely over three miles a day, as the cart tracks followed by the carters in many instances are so bad as (greatly) to impede their progress.' The construction of good forest roads is unquestionably of great importance for facilitating timber operations, and is likely to secure an enhanced revenue from the sale of miscellaneous forest produce."

By extending communications to the Nepal frontier it was hoped to render available the sâl and sissu forests situated under the hills, where the timber was of large girth, and such was required for the gun-carriage factory at Futtegarh.

The sanctioned forest establishment in 1866 was not large. It consisted of the Conservator and two Assistant Conservators (a second had been temporarily sanctioned during the year), Mr. C. Chapman and Lieutenant W. R. Martin. The total cost

excluding Martin's salary, was Rs.1,050 per mensem for the officers (700 and 350) and Rs.106 per mensem for the office staff. An extra Rs.80 was proposed to pay a small staff to register the number and scantlings of timber entering British territory from Nepal. The Chief Commissioner had observed that to carry out the present work, which had become imperative, it was absolutely necessary to give the Conservator further assistance. It was shown that from the commencement of the forest operations in 1861 up to 30th April, 1866, the balance in favour of the Department amounted to Rs.1, 06,029 and the net profit for 1866-7 amounted to Rs.82,040, a considerable increase on the previous year.

Wood held the appointment of Officiating Conservator throughout the year 1867-8 and prepared the Progress Report of these forests for that year under the headings already laid down by Brandis for these Reports. The Report was very long though of high interest, and drew from the Government the remark, even at this early period in the life of the Department, that it would be necessary to keep these Reports within reasonable length.

During the year the main operations and work had been confined to the 1st and 2nd Divisions; in the 3rd Division (Gonda) the settlement and survey officer (deputed to the duty of forest demarcation) was engaged in laying down the boundaries between Oudh and the North-West Provinces and therefore had been unable to proceed with the demarcation work in the Gonda District. It was stated, moreover, that "the grazing, etc., contracts of the 3rd Division still remained (pending regular settlement) in the hands of the Maharajah of Bulram-pore." The erection of permanent boundary pillars was in progress in the Kheri and Baraich Divisions, but had not for the above reasons been commenced in Gonda. As a full staff of assistants had been sanctioned for Oudh it was hoped that demarcation work and erection of pillars in the latter division would be undertaken during the ensuing year.

According to the revised figures the areas of the three divisions, still considered approximate only, were as follows: I. Division in Kheri District, 263 square miles. II. Division in Baraich, 269. III. Division in Gonda, 170. Total, 702. With regard to the vegetation, they are divided as follows: Sal forests, 425 square miles; Sissu and khair, 42; Miscellaneous, 158; Grass lands, 77; total, 702.

Read had suggested that the forests in certain waste lands

south of the Sardah River in the Mohumdee District should be included in the Reserved Forests. The Conservator also wished to add to the State Forests two forests in the Baraich District, the Charda sâl forest and the Rajghur Singha tract. The inclusion of the first-named area was still under consideration, whilst on the latter the Oudh Government had stated that "the claims of private parties to these forests require judicial settlement in the regular Courts before further action can be taken." In their Review of the Report the Government of India (No. 359, F., dated 12th November, 1868) alluded to the description of the forests in the three divisions enumerated in the Report, and to the details given of the requirements of the agricultural population in the vicinity, which they had hitherto been in the habit of obtaining from the forests. Brandis had submitted to the Oudh Government detailed proposals for the settlement of these matters. The subject had already been under discussion between the Government of India and the former Chief Commissioner of Oudh. The Government of India gave a short review of the present position, and recorded an expression of their own opinion on the subject :

"The work of demarcating the Oudh Forests commenced in 1862, in what is now called the Kheri District, between the Sardah and Korially Rivers.

The then Chief Commissioner considered that all the waste lands in that part of Oudh had become the property of the State at the time of annexation, and were thus declared at the settlement of 1858. This view he recorded in a letter to the Government of India of the 1st September, 1863 (paragraph 19).

Subsequently, Government forests were demarcated in the Baraich and Gonda Districts, and it is supposed that in these districts also the rights of Government over the forest lands were at the time considered to be unquestioned.

In connection herewith it may be noticed that waste lands in the same districts in which the forests are situated have been sold and granted in proprietary right, and that other waste lands were advertised for sale. It is probable that on some of these lands the people were in the habit of grazing their cattle, of cutting wood, and collecting other forest produce, and His Excellency in Council desires to be informed whether, in the case of such sales or grants, the privileges formerly exercised by the inhabitants were reserved to them, or whether

they were extinguished ; and, in the latter case, whether any equivalent or compensation was given to the people.

The forest rules, which were promulgated in September, 1866, were apparently framed on the supposition that Government held the forest lands that had been demarcated as State forests, subject to no rights or privileges of other parties ; in other words, that these forests were not encumbered by customary right or privileges. These rules imply that the right to all the produce of the forest is vested in the Government. Thus, all interference with trees, timber and forest produce, without the authority of the Conservator, is prohibited in Rules VI, IX, X and XI. Burning grass or jungle, clearing the forest for cultivation, burning lime or charcoal, or the grazing of cattle, is prohibited by Rule XII ; provision to protect the forest against fires from outside the forest limits is made in Rule XIII ; and the power of closing existing roads through the forests is assumed in Rule XIV.

A limited permission to cut unreserved timber for their own *bona fide* use for domestic and farming purposes is granted in Rule VII to villagers living in the forests or within three miles of the Government boundary-line, but this concession was apparently made as a free gift on the part of Government, and not as a matter of right. If the above view of the rights of the State in these forests is correct, then all further concessions that have been made, or that may still have to be made, to satisfy the requirements of the agricultural population in the vicinity of the forests, must apparently be regarded in the same light.

It was reported in your predecessor's letter of the 2nd July 1867, that it was intended to enforce the prohibition against the grazing of cattle gradually, and that it was proposed, over and above the additional areas of waste land included within the new boundaries of villages, to allot to them certain parts of the forests as fuel allotments, by way of compensation for all the privileges which they may have lost by the introduction of strict conservancy rules.

In your review of the present Report, however, it is said that much difficulty has been experienced in satisfying the *talookdars* and villagers, and that, though the subject has received unremitting attention, but little progress has yet been made towards its solution.

It is gathered from the Report on this subject, submitted to you by the Inspector-General, that in a large portion of the

forests it will be found difficult to effect the demarcation of fuel allotments, and that the requirements of the surrounding population, and the arrangements for satisfying them, must be considered in detail, separately with reference to each subdivision of the forest; that, in fact, a detailed enquiry into the circumstances of each village must be made. To make this enquiry in a satisfactory manner the Inspector-General has suggested to you the appointment of a special commission, consisting of an officer of Revenue and one of the Forest Department, whose joint Report, subject to an appeal within six months, would be final when sanctioned by the Chief Commissioner.

Regarding these proposals an expression of your views will be awaited.

Should you entertain the proposal of entrusting the settlement of this matter to a special commission, it appears right to state that, if the basis on which the Oudh Forest Rules were framed, that is, the assumption of complete rights of the State in these forests can be maintained, there will be no necessity for giving legal force to the decisions of the commission, for any concessions that may be made will be free concessions on the part of Government.

But if the basis of the existing rules is not tenable, then a clause must be inserted in the Oudh Forest Rules, giving legal force to the decisions of the commission when sanctioned by the Chief Commissioner, and this will require an additional section in the Forest Act. Under all circumstances, His Excellency in Council considers that it will be proper to insert such a section in the Forest Act, to enable local Governments to effect a satisfactory settlement of customary or prescriptive rights in the forests.

The Governor-General in Council regrets to observe that, in your opinion, Captain Wood has not been sufficiently alive to his duty in the matter of acting in consultation with the civil authorities regarding the claims of the inhabitants near the forests.

His Excellency in Council desires that every exertion shall be made to reconcile the wants of the agricultural population with the requirements of a rational management of the forests, and he concurs with you in the hope that Captain Wood will, for the future, show more skill in conciliating the various interests with which his operations bring him into contact."

they were extinguished ; and, in the latter case, whether any equivalent or compensation was given to the people.

The forest rules, which were promulgated in September, 1866, were apparently framed on the supposition that Government held the forest lands that had been demarcated as State forests, subject to no rights or privileges of other parties ; in other words, that these forests were not encumbered by customary right or privileges. These rules imply that the right to all the produce of the forest is vested in the Government. Thus, all interference with trees, timber and forest produce, without the authority of the Conservator, is prohibited in Rules VI, IX, X and XI. Burning grass or jungle, clearing the forest for cultivation, burning lime or charcoal, or the grazing of cattle, is prohibited by Rule XII ; provision to protect the forest against fires from outside the forest limits is made in Rule XIII ; and the power of closing existing roads through the forests is assumed in Rule XIV.

A limited permission to cut unreserved timber for their own *bona fide* use for domestic and farming purposes is granted in Rule VII to villagers living in the forests or within three miles of the Government boundary-line, but this concession was apparently made as a free gift on the part of Government, and not as a matter of right. If the above view of the rights of the State in these forests is correct, then all further concessions that have been made, or that may still have to be made, to satisfy the requirements of the agricultural population in the vicinity of the forests, must apparently be regarded in the same light.

It was reported in your predecessor's letter of the 2nd July 1867, that it was intended to enforce the prohibition against the grazing of cattle gradually, and that it was proposed, over and above the additional areas of waste land included within the new boundaries of villages, to allot to them certain parts of the forests as fuel allotments, by way of compensation for all the privileges which they may have lost by the introduction of strict conservancy rules.

In your review of the present Report, however, it is said that much difficulty has been experienced in satisfying the *talookdars* and villagers, and that, though the subject has received unremitting attention, but little progress has yet been made towards its solution.

It is gathered from the Report on this subject, submitted to you by the Inspector-General, that in a large portion of the

circumstances be cleared through the forests, which will make them sufficiently accessible for all purposes of protection and management."

Already a number of lines had been cut through the forests under the Conservator's orders with a view to dividing them up into manageable blocks of about equal size. Some of the main lines were to be converted into fair-weather roads in order to facilitate the export of timber. The Conservator correctly enumerated the advantages of these lines, thereby displaying the rapid advance which was being made at the period in forest organisation in Oudh ; viz., they would render possible the valuation of the growing stock in each block or compartment, facilitate control and inspection, help to prevent and control fires, furnish the basis of a systematic plan of operations and facilitate the export of timber and other forest produce.

In a Report on the Kheri Forests, dated 23rd June, 1863, Brandis had given an estimate of the rate of growth of the sâl in that division. Wood had carried on the investigations by counting the rings on a number of stumps and logs. The following is a comparison of the two results, which were recognised as being only preliminary ones :

	6' Girth.		4' 6" Girth.
Brandis, 1863	80 years	.	50 years.
Wood, 1863	95 "	.	65 "

From the results of his felling operations it had become apparent that a large proportion of the mature trees in the forests were unsound, Wood considering that only one-third of the trees would, he feared, be sound. In 1863 it had been estimated that the Kheri Forests would be able to supply 4000 mature trees annually. If Wood's analyses were correct it would considerably affect the annual yield, as it was not proposed to commence regular felling operations yet in the other divisions. For the present Wood's estimates had been accepted and a plan of operations for the two following years had been drawn up for Kheri by the Conservator and the Inspector-General, based on the data available at the time. The plan limited the number of trees to be felled during the period to 2900, including besides sâl two other reserved species of tree, "asna" (*Terminalia tomentosa*) and "haldu" (*Adina cordifolia*), the wood of which was said to be in demand. The plan also laid down the order in which felling operations

were to be commenced and continued. This plan had been approved. Altogether an excellent commencement.

The creeper cutting had been continued, nearly 150 square miles having now been worked over in Kheri at a cost of Rs.14,612, or Rs.98 per square mile. The Kheri Forests had now been cleared, and in addition 1,62,527 acres had been cleared during the year in the Baraich Division, where the work was lighter, at a cost of Rs.10 per square mile.

The felling operations and carriage of material to the depots were to be undertaken by the Department in accordance with the orders laid down by the Government of India on this subject. The arrangements for the export and sale of the timber had received careful consideration and a joint Memorandum by Brandis and Wood on the subject of the best lines of export and the places for depots had been prepared. In this they explained that there were two main lines of export from the Kheri Forests ; one down the Gogra River to Byram Ghát, where it was proposed to establish a sale depot ; another in a westerly direction towards Bareilly and Shahjehanpur. For the latter a depot would be established either on the Sarda or on the Sohelee River. A considerable amount of local opposition from vested interests had made itself felt on this subject, but Government had approved of these proposals.

No plantation work of any kind had been commenced in connection with the Oudh Forest Department at this period.

The position of the Conservator of Forests, or Superintendent as he was designated, had been a rather anomalous one. On the subject Brandis wrote : " Regarding the Superintendent himself, I would recommend that his designation be changed to the more appropriate one of Conservator of Forests, Oudh, and that he be required to make Lucknow his head-quarters during part of the time when forest work is stopped on account of the reputed unhealthiness of the forests. It is certainly very desirable that the Forest Officers in this country should have as much as possible an opportunity of recruiting their health on the hills, but the Conservator of Forests is subordinate to the Chief Commissioner, and must transact business with his secretary. I do not see how this business can be transacted in a satisfactory manner without at least a few months' personal intercourse at head-quarters. If the plan were to be continued to make the Conservator subordinate to the Commissioner of the Khyrabad Division, Seetapore ought to be his head-quarters during a part of the recess, but I do not think the

interposition of the Commissioner between the Chief Commissioner and the Conservator will result in much real good. The most suitable time for the Conservator's sojourn at Lucknow would appear to be before the commencement of the working season, when the Budget is prepared, and arrangements for the work of the season are made."

The Chief Commissioner approved, and the paragraph expressing his approval is worth reproducing, since a similar procedure became established in other provinces :

" Mr. Read's " (Read had rejoined his appointment from furlough) " official designation may properly be changed to that of Conservator of Forests. The Chief Commissioner also thinks he should reside at Lucknow from the 15th September to the end of October, while the Report of last year's operations and the projects of the ensuing year are under preparation and discussion. But he sees no objection to his passing the time from the 15th May to 15th September on the hills. The Chief Commissioner gave his reason for corresponding with Mr. Read through the Commissioner of Khyrabad in a letter to Government, No. 119, dated 2nd February; but since a new Commissioner, ignorant of the localities and of the past history of forest management, has taken the place of Colonel Barrow, and as the Chief Commissioner has lately passed some time in the forests with Mr. Read, and made himself acquainted with all forest questions, he is inclined to agree that the interposition of the Commissioner may be dispensed with."

The financial results of the year were less favourable than the preceding year, but they were counterbalanced by the large value of the stock on hand. The receipts were Rs.66,453, charges Rs.93,633, the deficit being Rs.27,180.

In a Memorandum dated 25th October, 1868, Brandis directed attention to the Standing Order (October, 1866) on the subject of the main division of subjects upon which Annual Reports were to be drafted. Since that time, Brandis wrote, considerable progress had been made in some provinces with the demarcation of State forests, especially in Oudh and the Central Provinces. He thought that in these provinces it might now " be expedient to adopt another and more rational arrangement of headings," the former form being still maintained in the provinces where the State forests had not been demarcated, or where the operations in this direction had only been commenced. The following is a

summary of Brandis' new suggestions, each heading being treated of in detail in the Memorandum. It marks another step forward in the progress of the Department :

Introduction.—Statistical data, and forest legislation.

FIRST PART, SPECIAL

I. State forests and leased forests—

1. Area, boundaries, descriptive account.
2. Requirements of the surrounding population, prescriptive rights.
3. Protection.
4. Management and improvement.
5. Yield and working of the forests.

II. Unreserved or district forests.

III. Village and private forests.

SECOND PART, GENERAL

I. Financial results.

II. General remarks.

The points of interest in connection with the progress made during 1868–9 can only be alluded to briefly. A ditch 850 yards long had been dug in the Baraich Division to mark one of the boundaries as an experiment to keep cattle out of the forests. The value of this work, in consideration of its cost, was to be carefully watched. The question of commencing the formation of khair and sissu plantations as fuel reserves in selected localities was under consideration.

Captain Losack and Mr. Dodsworth are first mentioned as Forest Officers.

Wood's Annual Progress Report for 1869–70 is an interesting document drawn upon Brandis' new model. Wood was now the permanent Conservator and considerable progress had been made in Oudh. Wood's work and negotiations in connection with the transfer of the waste lands in Kheri, south of the Sardah River, was meeting with success. The area amounted to 285 square miles, of which 19,000 acres had already been made over to the Department, and the Government of Oudh were anxious that the whole of the tract should be managed by the Department as it was better suited for the growth of sâl wood than for ordinary cultivation. The Government of India commenting on this

opinion said : " If this can be effected it will, His Excellency in Council is inclined to think, be a very important addition to the Oudh Forests." The serious question of freeing the forests from the customary rights or privileges to cut wood or graze, etc., had not yet been settled. The Government of India impressed on the Chief Commissioner that this important matter should not be lost sight of. Brandis had suggested that the claims and requirements of each village should be inquired into and decided by a special Commission, consisting of a Revenue Officer and a Forest Officer. The Chief Commissioner was not prepared to recommend this step. The Government of India said that if special legislation was found to be necessary to give effect to the action it might prove advisable to take on this matter, they would be ready to consider any proposals submitted to them. In any event and by whatever means the problem was dealt with, and it might prove different in different localities, of its importance to the well-being of the forests there could be no doubt. It was very necessary therefore that the position should be faced and the difficulties settled satisfactorily.

During the year operations had been undertaken by Wood, with some success, to make the Sohelee River and one of its tributaries floatable. The prosecution of forest offences and a scheme for the introduction of fire protection are also commented upon, it being ordered that in future " a return of all forest offences and of the prosecutions and convictions " be submitted with the Annual Report. This appears to be the first allusion to this now well-known return. The financial returns were still considered unsatisfactory, the receipts being Rs.1,06,822, charges Rs.1,05,168 and surplus Rs.1,654. There was a considerable amount of unsold stock on hand during the year. On this head the Government of India wrote : " The aggregate cash surplus, since the formation of the Forest Department in Oudh, at the close of 1868-9, was Rs.2,11,254 ; adding the surplus of last year, we have Rs.2,12,908 as the result of eight years and a half forest administration in Oudh, but not Rs.2,56,462 as erroneously stated by the Conservator. His Excellency in Council thinks this a poor result. It is true the forests are not very extensive, and a portion is much devastated, yet it seems probable that a much larger revenue might be obtained from them. Hitherto the Conservator's energy has been mainly directed to works of improvement, such as clearing streams, making roads, wells, division lines in

the forests ; but it seems time now that Government should derive some increase of revenue from these operations."

The only plantation Wood had yet recommended was near Fyzabad, which had apparently been commenced during the year. He had also had some young bamboos planted near Newal Khar, in the vicinity of the Sohelee River, which were doing well. He had formed this plantation with the idea that the bamboos would be useful for floating rafts of sâl timber (which would not itself float) down the river.

Wood had suggested a plan of eventually making use of traction engines (the forest and export lines are mostly in level or gently undulating country) to do the principal part of the carriage of timber and fuel. The Government of India approved of the suggestion and the Secretary of State (Argyll) had readily given his acquiescence, and had called upon Wood, who was at home on furlough, to carry out enquiries on this subject and submit his proposals on the construction of one suited to the Oudh Forests.

Describing the Oudh Forests as he found them a year or two after the close of this period, Sir S. Eardley Wilmot, in his *Forest Life and Sport in India*, says :

" At this time the protection of the forest from fire was giving much trouble. The people did not understand why they should abandon the immemorial custom of firing the forest in order to obtain a new growth of grass, or to make hunting and netting easier, or to restrict the raids of wild beasts on their crops or on their domestic animals. A system of broad ' fire-lines,' or cleared rides, had been devised in order to locate any fire that might break out, and so permit of counter-firing, but the task at that time seemed almost hopeless ; fires occurred almost every year, and their intensity and the consequent damage were in proportion to the period of successful protection that had preceded them ; and, moreover, each such catastrophe cast a slur on the Forest Officer's administration, often undeservedly, for it was not sufficiently recognised that in the East education can but slowly affect the habits of the people. They had to be taught in practice the difference between the value of a burnt and an unburnt forest, and, as the population increased, it had to learn how the forest could be of importance to the community, where before it was an enemy to be fought by a few opponents who regarded fire as their strongest weapon. With patience and

perseverance this lesson has long since been learnt in the Oudh Forests, and the struggle is now transferred to other provinces where the Forest Officer is working as a pioneer in the van of civilisation, securing for the State a property which, when the country is settled, when landownership, so dear to the Eastern heart, is assured, and when the benefits of a regulated forest to an agricultural population are understood, will be perhaps more valued by the people themselves than even by their rulers ; for the first have a personal and practical experience that forest products are indispensable to their welfare, while the others can only form an estimate of the inconveniences of strict Forest Conservancy."

Writing of Oudh and the North-West Provinces generally as he found it in the early 'seventies (and consequently as it was at this period) and of its forests and its communications Eardley Wilmot draws a picture between that time and the present worth reproducing, since it paints in unmistakable lines the great work which the British have carried out in India during the last half-century :

"I joined," he says, "the Indian Forest Service on December 3rd, 1873, at Lucknow. At that time the bridge over the Ganges at Cawnpore was not completed, and Oudh was a non-regulation Province ; that is to say, it was administered by a Commission whose members had been recruited chiefly from military officers—men who were here, as in the Punjab, in the Central Provinces and in Burma, preparing the way for more settled rule, and, their work accomplished, were being replaced by members of the Indian Civil Service, men who had no experience of the sword, which in the East inevitably preceded the more mighty pen. It was but fifteen years since the great Mutiny had been quelled, and our companions were, some of them, men who had taken part in it ; its memory had not been forgotten by the people, who could tell more than they cared to of the pacification of Oudh. The numerous extensions of the Oudh and Rohilkhand Railway were at that time not opened, and the Rohilkhand and Kumaun line was not commenced ; the Bengal and North-Western Railway had not extended its operations towards the northern districts of the Province.

But good-fellowship resulted from isolation ; the officials of the Province were all known to each other, and hospitality was the custom of the day. The 'dak-bungalow,' or travellers'

rest-house, at the headquarters station of the district would not have paid its way had it been dependent on the visits of Government officials, who went, as a matter of course, to the houses of their colleagues. The military outpost of Sitapur, held then by Queen's troops and native cavalry, was reached by posting along the now nearly deserted highway. The traveller was offered a police escort, and his refusal was committed to writing, for the justification of the authorities in case of outrage; for as a rule one preferred to run the risk of robbery-under-arms to loading the wretchedly horsed box-on-wheels in which one travelled with the weight of two policemen, who might perhaps be the friends or relatives of the dacoits; but one went armed with a serviceable revolver. Northwards from Sitapur, Kheri lay twenty-eight miles away, and it took seven hours to reach it in a dooli; beyond that was the unknown, and again the dooli, with its band of 'kahars' of 'banghiwalas,' and of 'masalchis,' was requisitioned to bear the traveller through the misty night, through jungle and grass, across the great Sardah River, and so on to the Government forests on the confines of Nepal.

Once arrived, the Forester would probably not see a white face—save occasionally that of a fellow-officer—until the return to headquarters—eight months later through the monsoon floods, unless happily he encountered a shooting-party on its way to Nepal, or persuaded some friends to aid for a time in dispelling the loneliness of his life. At present, Lucknow is only separated by about thirty hours' journey from Bombay, and this time may be spent commodiously in an express train with restaurant accommodation; while from Lucknow one may nowadays enter the saloons of the Rohilkhand and Kumaun Railway one evening, and the next be at the railhead on the Nepal frontier.

The Trans-Sardah Forest, where I first was posted as Assistant, comprises an area of about 300 square miles abutting on the Nepal border, and on its outskirts were numerous small villages, struggling against malaria and against the disadvantages of the jungle and the raids of its wild beasts; there were then probably few populous and wealthy villages within a distance of 5 miles of the State reserves. Inside these the aboriginal Tharus were settlers, and they, on an area of about 30,000 acres, enjoyed what the peasant of the plains considered to be the greatest drawbacks to the locality. They were proof against malaria, and mighty hunters and fishermen; they fed

on rice, flesh and fish, distilling their own liquor, and, like the Burmans in the north-east of India, tattooed themselves with indigo, were adepts at the manufacture of artistic baskets, and answered no call to work for others when they could otherwise live in comfort. The forests even then were recognised as being amongst the most valuable of Upper India; they were composed almost entirely of *Shorea robusta*, or 'sâl,' with a mixture of *Terminalia tomentosa*, or 'sain,' and other valuable species standing on the high alluvial land. Lower down, the 'shisham' and the 'khair' formed pure forests water-sown by the floods sent down from the Nepal Hills.

The whole area had been devastated by fire and by unregulated felling. The forest was burnt over every year by the Tharus to clear the undergrowth for hunting, and by the graziers to obtain a crop of young grass; while anyone might in former days have felled half a dozen trees of six-foot girth for a rupee, and have selected one of the best for removal without further payment. The best had thus disappeared, and the forest was full of fallen timber and of trees tapped either for the extraction of resin or to verify their soundness. Beyond a two-roomed shanty at Duduaghat, now a station on the railway, there were no houses in the forest, and tents were the only shelter against the frosts of winter, the heats of summer and the breaking of the monsoon. Once a week a runner arrived from headquarters with news from the outer world and with a small stock of its luxuries; a bullock-cart took three weeks or more to reach the nearest railway-line, and to return with a load of the more bulky necessities of life."

CHAPTER XI

FOREST OPERATIONS IN BENGAL AND ASSAM, 1865-1870

IT has been mentioned (I, Chap. XXVII) that no attention had been paid to the question of introducing conservancy into the Bengal Forests during the previous periods into which this history has been divided.

In January, 1863, the Government of India requested the Bengal Government to give its attention to the conservation of the forests under its jurisdiction and to "favour us with its views as to the best course to be adopted in placing this branch of the administration on a more efficient footing." In September, 1864, the enquiries set on foot by the Bengal Government, which had been undertaken by Dr. T. Anderson, the Superintendent of the Royal Botanic Gardens, Calcutta, resulted in this officer being temporarily appointed as Conservator of Forests, Lower Provinces, in addition to his other duties. His instructions were to submit a scheme for conducting forest operations in British Sikkim and Assam. Dr. Anderson's proposals were submitted in January, 1865, and included also the working of the forests in the Bhutan Duars. Military operations were, however, being carried on in Bhutan at this period.

The enquiries into the condition of the forests were instituted by Anderson on sound lines, and have resulted in presenting us with a succinct account of the position of the Bengal Forests at the period

It will be remembered (I, p. 512) that, towards the end of 1862, Anderson had discussed with Brandis the policy to be pursued with reference to introducing Forest Conservancy into the Bengal Forests. Brandis had already made a tour through a part of these forests, having received orders to do so on his way from Burma. In addition to the charge of the Botanic Gardens, Anderson also held charge of the Government cinchona plantations in the hills in which four Europeans were employed, one of whom was Mr. G. Mann. This officer

Anderson recommended should be appointed Assistant Conservator of Forests in charge of the Sikkim Forests. The preliminary conservancy proposals he drew up and the staff he would require have already been detailed. They had reference to the British Sikkim Forests only, and his idea was to commence exploiting the sâl forests on the western bank of the Rungeet River for timber. His suggested operations for the east or Bhutan side were not sanctioned at the time, as military operations were still being carried out on that side. His descriptions of the sâl forests of the Terai at the foot of the hills and of the Great Rungeet and the temperate forests of British Sikkim as then known have been already alluded to in Volume I (p. 517) of this work.

Anderson had proposed that exploitation should be started in the British Sikkim Forests and that a timber depot should be formed in the plains at some spot between Sivoke and Jalpaiguri. To the suggestion that Dubri should be selected as the site of this depot and in reply to the request for an estimate of the number and cost of sâl sleepers which he could send to this depot within the following two years, he wrote :

“ I have the honour to remark that it is impossible for me, or anyone else, to give such an estimate. At present no data of any kind exist of any use whatever in forming such an estimate. I am not aware if there exist any special reasons for selecting Dubri as the site of a depot for railway sleepers, but if there are none, then viewed merely with reference to the position of the forests, from which any large supply of railway sleepers of sâl can come, for an extension of the railway from Korshten, Dubri is the least suitable for a timber depot. From the information supplied me by the Commissioner of Assam in the Reports from the officers of districts in Assam, it is evident that the supply of sâl sleepers for Assam must be sought for in the forests of the Bhutan Duars. The rivers consist of : 1st, the Tista, draining the waters of the Duars on its left bank only and joining the Brahmaputra between Serajgunge and Bugwah ; 2nd, the Durlah, composed of the Mansae, the Toorsa and the Boora Toorsa, containing the Chamoorchee, the Balla and the Madar Duars, and reaching the Brahmaputra at Burwah. The Guddadhur, after the Monas, the largest branch of the Brahmaputra, is the next river from the Duars : it drains the Buxa and Bulka Duars, and joins the Brahmaputra below Dubri. As no timber can be profitably dragged against the



VERY TYPICAL MIXED FOREST IN INDEPENDENT SIKKIM. ELEVATION 4000-7000 FEET. THE STREAM IS A TRIBUTARY OF THE GREAT RUNGEEL, NOT FAR FROM THE MONASTERY OF TEMIONGHI. THE VIEW IS TAKEN LOWER DOWN BETWEEN CHAKUNG AND RINCHINGPONG.

Photograph by Professor H. Wright Smith

stream, the timber which would be carried by these rivers into the Brahmaputra could not be stored at Dubri. Above Dubri the only large stream from the Bhutan Duars is the Monas, a first-class tributary of the Brahmaputra which it joins opposite Goalpara.

From this it is evident that at Dubri the timber of only a very small tract of country could be stored, while to Bugwah or Serajgunge the timber of all the Bhutan Duars and Assam might be brought, and to the latter all that of Sikkim drained by the Tista."

In the Tista Valley the sâl forests in British Sikkim are on the right bank of the Tista and those in British Bhutan on the left bank. Anderson suggested that the two areas should be worked as one for forestry and exploitation purposes. By means of cane bridges or boats he said it would be easy to pass from one bank to the other, the material from the valuable sâl forests of the Great Rungeet being floated down the river, the sâl sleepers, which will not float, he suggested being tied to sleepers of *Pinus longifolia* in order to render them buoyant.

Having held charge of both the Darjiling and Sikkim (now termed the Tista) Divisions the author can well appreciate, as will other Forest Officers who have held these charges, to what a small degree their great potential capacities in the interests of the people were realised at this period.

A Forest Conservancy establishment, including that of the suggested timber depot, was proposed by Anderson at a cost of Rs.17,604 per annum, including the salary of the Assistant Conservator already sanctioned.

The Government of India in a Resolution on the Bengal Government's letters forwarding Anderson's Reports and proposals, agreed that the British Sikkim Forests and those of the annexed Bhutan Duars, which had not yet been explored, appeared to be very valuable; and that "taking into consideration the growing scarcity of sâl timber to the east of the Great Gundak, the conservation of the forests in British Sikkim is desirable, and the appointment of an Assistant Conservator with a small establishment requisite." They did not consider that any work should, in view of the fact that military operations were still being carried on in Bhutan, be commenced at that time in the Duars, and thought that the suggestion for storing timber at depots was premature. They therefore cut down the cost of the suggested establishment to

Rs. 9,972 per annum, "it being open to the Bengal Government to propose its expansion as experience shows such to be required."

The Secretary of State for India commented as follows on the above Resolution in a Despatch dated 16th November, 1865 :

"I approve your appointment of Dr. Anderson as Conservator of Forests. His special knowledge and experience rendered his services peculiarly desirable for putting the Conservancy Department on a good footing at first. It is so important that a good system should not only be introduced but fairly put on a good course that I trust you will not remove Dr. Anderson when the year for which you appointed him is expired, unless you are satisfied that a proper system of conservancy is so firmly established that his services can be dispensed with." This allusion of the Secretary of State to "the year for which you have appointed him" had reference to the previously expressed wish of the Bengal Government to appoint a whole-time Conservator and not one who had other duties to perform as was the case with Anderson, who still remained Director of the Calcutta Botanic Gardens. At the end of two years Anderson himself asked to be relieved of the post of Conservator on the ground that his work at the Botanic Gardens was neglected and that his purely scientific work had remained untouched during the period he had held the Conservatorship, the work of which was sufficient to fully absorb the energies of a whole-time man.

The Secretary of State's Despatch continued :

"A commencement has already been made for the conservancy of the Sikkim Forests, belonging to Government. They seem to be of considerable extent, and to contain valuable timber. I trust that the means provided will be found sufficient to work them to the best advantage. It is prudent, doubtless, not to make a beginning in the Bhutan Duars until the military operations on the frontier are concluded, and all chance of interruption done away with.

I perceive that you did not accede to the proposal of Dr. Anderson to appoint at once an Assistant Conservator, with a small establishment, to begin operations in the Assam Forests. This seems to have been because you deemed the question of Forest Conservancy not sufficiently settled until



THE SÀI FORESTS IN THE TUSTA VALLEY, LOOKING NORTH OF THE RIVER. THE BHO LÂN SIDE,
 NOW BRITISH, IS ON THE RIGHT OF THE PICTURE
Photographed by Prince of Wales, 1904

Dr. Anderson had personally examined the forests of that Province. He remarked, however, that, judging from the Report of the Commissioner of Assam, there must be valuable forests to preserve.

I much regret the delay which has occurred in establishing a system of conservancy in the Bengal Forests, to which your Government allude. In paragraph 10 of my Despatch of 26th February, No. 5, of 1863, I expressed my desire that the inspection of the forests of the Province of Assam should not be delayed. I hope that Dr. Anderson will have soon completed his enquiries, and should these forests, or those of any Province under the Bengal Government, hold out a well-grounded prospect of advantageous conservancy, I shall, in accordance with paragraph 9 of my Despatch above quoted, be ready to sanction any reasonable recommendations which you may make to me for the outlay necessary for that purpose."

When the above Despatch is contrasted with some of those on the forestry question emanating during the preceding half-century from the Court of Directors it becomes evident that the Home Authorities were now fully alive to the fact that the introduction of Forest Conservancy, at least so far as conserving and perpetuating the timber supplies, had become a question of the first importance. This, as has been shown, is borne out by the Secretary of State's Despatch, No. 5, of 26th February, 1863, alluded to above, which is quoted in the last chapter of Volume I.

The following extract from the First Progress Report of the Forest Department of Bengal, 1864-5, by Anderson, is of interest since it describes the position at the end of the first year in the life of the Department.

Forest Conservancy in Bengal was inaugurated in August, 1864. The remainder of the year Anderson was occupied in inspecting the Sikkim Forests and arranging for the commencement of felling operations on the Great Rungeet, in organising his office establishment and in the compilation of the first Forest Budget for Bengal; the latter, he says, was a work of great difficulty owing "to the entire absence of data of any kind."

"Sikkim Division.—The appointment of an Assistant Conservator for the charge of the forests of this division was made in December. Mr. Mann, who had been in charge of the cultivation of cinchona at Darjeeling, was selected for this

appointment. I had the greatest difficulty in procuring suitable persons as overseers, and I was at last reluctantly obliged to remove Overseer Ryan from the cinchona nursery, and to appoint him as an Overseer in the Forest Department. Towards the end of the official year I obtained the services of two soldiers from the convalescent depot at Jellapahar, but neither of them promise to be of much use. Immediately on the establishment of Forest Conservancy in Sikkim a question arose as to what were Government forests as distinguished from those of the municipality of Darjeeling. This point was still under decision at the close of the financial year. Until it is settled no forest operation can be undertaken in the temperate forests.

Plantations.—A nursery of temperate forest trees was completed near Darjeeling in March. This nursery will be useful in rearing trees for the hills around the station of Darjeeling, which, by indiscriminate felling, have been stripped of the trees with which they were covered a few years ago. The nursery is about 5 acres in extent, and consisted of entirely cleared land, with a north-western exposure throughout its greatest extent. It is also situated on the land to be replanted. The preparation of the nursery was commenced in December, 1864, the seeds of the best class of timber trees of the temperate forests having been collected in large quantities during November. Owing to the proximity of the nursery to the public road and to the commissariat sheep and cattle yard, as well as from the large number of goats and other animals grazing near the station of Jellapahar, it was necessary to surround the site with a strong wooden fence. Footpaths had to be made through the site, and strongly built terraces were erected for the beds in which to sow the seeds.

The ground had, of course, to be deeply trenched throughout. This was partly performed by parties of European soldiers from the depot at Jellapahar. From the proximity of the nursery to the barracks it was found that this was the cheapest labour employed, but the soldiers were soon tired of the hard work of trenching the ground, and the work had to be completed by coolies.¹

The nursery, with the exception of a godown (shed) for tools,

¹ It is curious how history repeats itself. More than half a century later the nursery on the Dreghorn Estate, owned by the War Office, was similarly prepared by parties of soldiers awaiting demobilisation after the Great War. This nursery is used for instructional purposes by the Edinburgh University Forestry Department.—E.P.S.

was completed, as stated above, in March last, and all the seed has been sown. The expense of the purchase or collecting of seed and formation of the nursery up to its completion amounts to Rs.1,967.

The following is the list of seeds sown in this nursery, nearly all of which had germinated before the end of April: *Pinus excelsa*, *Pinus Gerardiana*, *Picea Morinda*, *Abies Webbiana*, *Cedrus deodara*, *Cryptomeria Japonica*, *Cupressus funebris*, *Cupressus torulosa*, *Juniperus recurva*, *Quercus lamellosa*, *Quercus Thomsoniana*, *Quercus sp.*, *Castanea sp.*, *Castanea Vesca*.

The seeds of the *Coniferae* in this list were obtained chiefly by collectors I sent in December to the Thibetian frontier. The seeds of *Cryptomeria Japonica* were obtained in the Station of Darjeeling from trees that had been raised from seed brought to India by Mr. Fortune on his first mission to China for tea seed. The seed of the *Cryptomeria Japonica* were given by Mr. Fortune to Dr. Falconer, Superintendent of the Botanical Gardens, Calcutta, for distribution in the hill stations. Those sent to Darjeeling have become handsome trees, which now bear seed abundantly. The seeds of oak and chestnut, except those of *C. Vesca* procured for me by Colonel R. Strachey, were all collected at Darjeeling in November. The species they belong to yield the most valuable timber of the temperate forests.

Arrangements have been made through the Colonial Office for the supply of twenty thousand seeds of mahogany from the West India Islands, for the formation of mahogany plantations in the Terai. The successful cultivation of mahogany trees near Titlayah, raised from seed produced in the Botanical Gardens, Calcutta, prove that this most valuable timber tree will find a suitable soil and climate in the Terai. The seed will arrive in August and will be raised in the Botanical Gardens, Calcutta.

Felling Operations.—In April 150 sleepers of sâl were cut near the banks of the Great Rungeet, with the view of testing the capabilities of that river for transporting timber. These operations had to be stopped abruptly towards the end of the official year from the prostration by fever of the two European overseers and many of the natives engaged in the work. Tchelm Lama, the Envoy at Darjeeling from the Sikkim Durbar, allowed thirty trees of *Pinus longifolia* to be felled on the Sikkim bank of the river. It is intended to use the light wood

of this tree in floating out the heavier sleepers of sâl. The forests of *Pinus longifolia* belonging to Independent Sikkim are very valuable, and endeavour will be made to obtain a favourable lease of them."

Soon after his appointment as Conservator Anderson had addressed a series of questions through the Secretary of the Government of Bengal (latter's Letter, No. 3478, dated 19th October, 1864) to all Commissioners of Divisions in Bengal. The information required was as follows: The nature and extent of the forests in their divisions, whether under any form of conservancy, the proprietary rights in them and the trees they contained; the revenue, if any, derived from the forests, whether any forest leases had been granted and their terms; whether the streams were used for floating purposes (other than the Ganges); the prices at which timber was sold, the nature and price of firewood, and whether rights to cutting firewood and bamboos by the villagers existed; whether any considerable forests in the division were owned privately and, finally, if shifting cultivation (Jhuming) was practised in the forests.

To the fortunate issue of this Circular we owe a fairly complete summary of the position of the forest tracts in the rest of Bengal at this period, and it is as striking as important. The replies of the Commissioners will be dealt with seriatim. They relate to the following ten Divisions: Bhagalpur, Sonthal Pergannahs, Patna, Rajshahye, Burdwan, Nuddea (Sunderbans and 24 Pergannahs), Cuttack, Chota Nagpur, Dacca and Cachar.

The Bhagalpur Division.—The districts in this division comprised Darjiling, Bhagalpur, Monghyr and Purneah. The forests in the first belonged to Government, those in the others to native proprietors.

Darjiling District.—The forests in the Terai contained a quantity of sâl and the banks of the River Mahanadi some sissu. It was estimated that about 12,000 acres of sâl mixed with other "valueless trees" existed in the Terai. The hilly portion of the Terai amounting to 50,000 acres and was to a great extent, the Commissioner stated, "covered with, so far as I know, valueless jungle"; there were about two or three thousand acres covered with valuable sâl on the bank of the Rungeet. For part of this Major Wardroper held a lease dated 8th November, 1854, rent-free for fifteen years, on condition that one-fifth be brought into cultivation in ten years. As



VILW TAKEN AT SUNRISE NEAR LONGJOO BUNGALOW, TO THE WEST OF PARHING. ELEVATION 9000 TO 10,000 FEET. RHODODENDRONS IN THE FOREGROUND. IN THE DISTANCE IS KINCHIN-LUNGA, 28,150 FEET. THE INTERVENING FOREST-CLAD COUNTRY IS UNDER ROLLING CLOUDS

Photograph by Professor H. Wright Smith

the condition had not been fulfilled this lease could now be resumed. The area commenced at the junction of the Little and Great Rungeet was about 5 miles long and 700 yards deep and consisted of about 1200 acres. The rest of the sâl was on land which was surveyed as included in a lease to Mr. Barnes, but it did not fall within the land he had a right to. By a recent order all land in the district, above 6500 feet, had been reserved for timber. A rough estimate of this area was some 60,000–80,000 acres in all. The only Forest Conservancy in existence in the Division was in Darjiling where the Senchal and Goompahar Ranges were reserved for firewood ; but no revenue was derived from the forests of the division. The price of firewood was from 2–8 annas per maund (82 lbs.). Sâl railway sleepers were floated out down the Mahanadi River. As regards shifting cultivation the Commissioner wrote on this point : “ The mode of cultivation alluded to was practised in the hills without damage to the forests, except to the patches actually cultivated, the dampness of the climate preventing the fire spreading ; it is now put a stop to by the issue of leases for compact areas. In the Terai the holder of the grazing ‘ mehal ’ annually fires the long grass, the cattle subsisting on the fresh shoots. This practice has doubtless considerably injured the timber, a considerable quantity of sâl to the south-east of the district being apparently hopelessly dwarfed from the effects.” Some 47 species of trees were enumerated as existing in the forests.

The above Report affords conclusive evidence of how little the great value of the Darjiling Forests was realised at this period.

In the Bhagalpur District there were a number of small areas of forest of varying dimensions ; in Monghyr a few small tracts and in Purneah none. The only forest of importance was that of Khurruckpur in Bhagalpur, which was the property of a minor and under the guardianship of Government. This was the only forest in the district which the Commissioner considered it would be worth Government’s while to lease. The right to cut timber in that forest was leased to Mr. Dear, a large contractor of Monghyr, for Rs.9,000 a year, the lease expiring in April, 1865. The Commissioner was willing to meet the views of Government with reference to their taking over the forests, as he had no doubt that a proper system of conservancy would be preferable to the unrestricted acts of a timber contractor. The firewood used in the district mostly

came from this forest. A fixed rate was paid to the "zemindar," and the people then went into the forest and cut what they wanted. There was no Government forest revenue in this or the other plains districts. Firewood sold at Bhagalpur and Monghyr at 4 annas a "maund," and in Purneah at 6-8 annas a "maund." No special tracts for cutting firewood were set apart in any of these districts. The villagers had no right to cut firewood or bamboos in the forests in the division, but in practice they did so cut them and were allowed by the "zemindars" to do so. In Bhagalpur timber of sâl, "sud sâl" (*Pterocarpus marsupium*), "abnoos" (*Diospyros tomentosa*) and sissu, 24 by 1 by 1, sold respectively at Rs.16, Rs.50, Rs.100 and Rs.25. This timber came down the rivers from the Morung or Nepal Terai, with some other species. No rivers were used for timber transport in Monghyr. In Purneah the timber came down the rivers from the Nepal Forests, chiefly sâl, "sissu" and "tun" (*Cedrela Toona*), which sold at from Rs.5 to Rs.13 per log according to size.

The Sonthal Pergunnahs Division.—This division consisted of an extensive tract of hill and forest known as the Damun, the property of Government, and of "pergunnahs" all round this Damun which belonged to "zemindars." The division was divided into the five districts of Rajmehal, Godda, Pakour, Doomka and Deoghur, the first three containing little valuable timber. The hills were described as mainly covered with scrub and underwood. The forest in the Godda District was estimated at 50 by 10 miles; in Deoghur a sâl forest of 237,722 acres in extent existed, whilst the Doomka District was estimated to contain a greater extent of forest than any of the others, but the timber was not considered to be of much value. No conservancy existed in the division, beyond a general prohibition to cut large timber, except where leases had been given out. A lease which extended to Doomka and Godda had been given to a native contractor to cut sleepers for the railway at 4 annas per sleeper—a sufficiently cheap rate. A similar lease had been given in the Pakour District, on which Rs.382 had been collected. In Rajmehal Rs.630 had been derived during 1864 for the right to cut firewood. The rivers Anjoy, More and Bansloe were used for rafting timber and firewood. The timber from Umbar was carted to the large "bheels" (marshes), which were annually inundated by the Ganges, the material being then carried in boats to Jungipur and Moorshedabad. In Pakour firewood was sold near the river-side at Rs.12.8 per

100 "maunds." Elsewhere the price ranged from Rs.6 to Rs.12 per 100 "maunds." In the Damun-i-koh and the Deoghur District the "ryots" possessed the right to cut firewood, bamboos and small trees for their houses and agricultural implements. As regards shifting cultivation the Commissioner said that it was very generally practised in the hills and had done a great deal of injury. The chief trees were "asan" (*Terminalia tomentosa*), "sâl," "mohwa," "kusum" (*Schleichera trijuga*), "palas" (*Butea frondosa*), "sirîs" (*Albizzia Lebbek*), "sud sâl," "urgun" (? Arjun, *Terminalia Arjuna*), "semul," mango and tamarind.

It is of interest to mention here that a Forest Division was not established in the Sonthal Pargunnahs until 1895.

The Patna Division.—The Commissioner stated that there were only two forest tracts in his division, one to the north of the Chumparun District, and the other in the south of Shahabad; both contained valuable and valueless timber. He was not aware of the actual extent of the former, the Ramnuggur Forest, but it was private property belonging to the Rajah. In Shahabad more or less the whole "pergunnah" Rhotas was forest land, consisting of an area of 521 square miles. There were also forest tracts in part of Chynepur. Some of the forests contained good sâl. On the subject of these forests the Collector of the District stated: "I cannot exactly say which of the tracts of forest belong to Government, as I have no information to show to what estates they belong, but Government holds the proprietary right in about 57,783 'beegahs' (in Bengal $3\frac{1}{2}$ beegahs = 1 acre) of forest and waste land in Rhotas and Chynepur." No system of conservancy was in force. The revenue derived from the forest tracts of the Shahabad District amounted to Rs.1,934 per annum and was derived from leasing certain rights of Government over some of the forest tracts which were known as "banskuttee mehal." The Collector explained this as follows: "Over certain of the forests of Rhotas, Government is possessed of 'banskuttee' rights. These rights are purely forest rights, and have no connection with the soil, which is permanently settled with 'zemindars.' The farmer has the right to tax those who cut firewood and timber for other than purely domestic and agricultural purposes, according to a certain schedule of rates. A tax is also levied on those who graze cattle. A Mr. Bingham has the lease at present, for which he paid the above-mentioned sum. His lease would expire in 1867."

In the districts of Champarum, Sarum and Tirhoot sâl and other timbers and bamboos were rafted down from Ramnuggur or the Nepal Terai, the rivers being the Gundak, Bagmutty, Lukundai and Little Gundak, whilst similar materials of small size were conveyed by the Soane in Shahabad and Behar.

The chief trees in the forests were sâl, "ebony," *Hardwickia*, *Terminalia chebula*, *Lagerströmia parviflora*, *Boswellia thurifera*, bijasar (*Pterocarpus Marsupium*), mango and "mohwa."

No tracts were specially set apart in the division for providing firewood. The Commissioner evidently failed to understand the drift of this question, for he wrote: "The firewood used at civil and military stations is procured by cutting down trees"!

In Patna the price of firewood was $3\frac{1}{2}$ to 4 annas a "maund," in Buxar and Arrah about the same. Only the villagers in Rhotas were said to have a right to cut wood and bamboos for domestic purposes free; the Collector thought this right was a prescriptive one. The Commissioner said it was possible that the Rajah of Ramnuggur and the "zemindars" in the Kymore Range in the south of Shahabad might be prepared to lease their forests to Government if liberal terms were offered. No shifting cultivation was practised in the division.

The Rajshahye Division.—The districts in the Rajshahye Division which contained forests were Bogra, Dinagepur, Rungpur and Maldah. Bogra had extensive forest tracts, the forests of Sheehpur and Natta being said to contain valuable trees, but the trees in the other areas were mostly valueless. In Dinagepur there were six small forest tracts, that of Heeraikutal (10 miles by 3 miles) being the largest. In Rungpur there was one sâl forest in "pergunnah" Bykuntapore, bordering the Bhutan frontier, 20 by 10 miles in area; while in Maldah there were two large tracts of forest, the timber said not to be of value, one in the Khurbat "thanna" and the other near Maldah city. The only forests belonging to Government in the division were Foola and one half of Sheelakoerpore and one half of Beernagore in Bogra. All the other forest tracts were private property. There was no Forest Conservancy in the Government forests and no revenue was derived either directly or indirectly from these forests, nor had any leases to fell timber been granted within them. Most of the timber in use in the division was imported, by means of the numerous rivers flowing through it, e.g. Tista, Mohamunda, Brahmaputra and several others, from the Assam Hills, Morung Hills and hills

bordering the districts of Purneah and Tirhoot. The timbers so alluded to were the sâl, "dhoom," and "dustee," etc. Most of the large bazaars of the division, such as Jalpaiguri in Rungpur, Singrah in Rajshahye, Berhampore in Moorshedabad and so forth, dealt in timber, and there were also several places on the banks of the large rivers at which timber was sold. The prices of timber varied in different places. In Moorshedabad timber known by the names of "chowker" and "dokers" was sold from Rs.18 to Rs.22 each, according to size and quality. In Bograh, "dhoom," $4\frac{1}{2}$ cubits long by $2\frac{3}{4}$ cubits in circumference, fetched Rs.6, "dustee," 10 cubits long and 2 in circumference, Rs.5, and "gujaree" (? *gugera*, *Schima Wallichii*), 10 or 12 cubits long and 1 in circumference, 8 to 12 annas. In Rungpur small timber varied from Rs.3.8 to Rs.7.8, and "dokers" and "chowkers" were sold at from Rs.7 to Rs.9 per *hath* in circumference. "Sissu" wood was sold at from Rs.5 to Rs.7 per pair. In the districts of Rajshahye, Patna and Maldah the prices varied, Rs.2 $\frac{1}{2}$ to Rs.40, according to size and quality of the timber. In the districts of Rungpur, Dinagepur, Bogra and Patna bamboo was generally used as firewood, where it grew abundantly; mango and other trees were also used for fuel. No special tracts were set apart for cutting fuel in the division; the price varied from 2-8 annas per "maund."

One of the private sâl forests, that of Bykuntapore on the Bhutan frontier, had been leased to Messrs. Dear and Co. for ten years and, says the Commissioner, "might probably be leased to Government when the lease of Messrs. Dear and Co. expires."

The Commissioner does not appear to have realised that by that time the forest would have been cut out and ruined. The trees in the forests chiefly consisted of sâl, "sissu," "banyan," "pakoir" (? *Ficus Rumphii*), "semul," "salian," "shurrul" (Jarul, *Lagerströmia Flos-Reginae*), "jack" (*Artocarpus integrifolia*), "and various sorts of unknown wild trees."

The Burdwan Division.—The districts of Bancoorah, Birbhum and Midnapur in the Burdwan Division contained small forests. The greater part of the Bancoorah District was said to be covered with young sâl trees, "or rather scrub, of very small present worth, and which is not permitted to grow into trees worthy of the name of timber." The tracts were all private property. In Birbhum there were eleven tracts of

forest situated in different "pergunnahs" containing large timber. The estimated area of each of the tracts was between 2000 and 3000 "beegahs." All these forests were private property. In what were known as the Jungle "mehals" in Midnapore District there were forests in seven "pergunnahs" containing "valuable and valueless timber." The extent of these tracts was not accurately known. The whole of the jungle "mehals" covered about 1200 square miles, but the "pergunnahs" enumerated in the district as *timber producing* included about 700 square miles of forest land only. All these jungles belonged to private individuals being, said the Collector, "included in their decennially settled estates."

No Forest Conservancy existed in the Burdwan Division. The trees growing in the division were the sâl, "ebony," "mohwa" (*Bassia latifolia*), "asan" (*Terminalia tomentosa*), "arjun" (*Terminalia Arjuna*), "peal" (?), "jam" (*Schima Wallichii*), "dhoa" (? dowa, *Artocarpus Lakoocha*), "moul" (? *Mæsa indica*), "ashna" (*Terminalia tomentosa*), "knesh" (?), and bamboos. No forest revenue was derived either directly or indirectly by the Government from the forests of the division. The Collector of Midnapore stated that "the proprietors cut the trees and sell them at times, and grant licenses, to be renewed every year, for preparing cocoons (spelt 'cuckoons') and 'dhoona' and for making charcoal." The allusion to "cocoons" was the native industry in jungle districts of obtaining silk from the cocoons of the silk-worm moths, species of *Antheræa*, etc. No leases in the forests had ever been granted for cutting timber, the Collector of Birbhum expressing himself as follows: "No lease whatever has ever been granted to cut timber or to collect caoutchouc from the forests of the district."

The rivers of the division were used to float out timber and forest produce, much of it cut in forests outside the division. The Collector of Midnapore, for instance, said that the timber of sâl, "peasul" (*Pterocarpus Marsupium*), "ashna," and "moul" was brought down the rivers, the size varying from 15 to 22 feet in length and from 3 to 6 feet in circumference. "These were generally brought down from the fine forests of Mohurbhanj, Jhargram, Silda, Nyagram, etc. etc. Mr. Clarke tells me that a through trade from Simlapal, in the Buncoorah District (also from the forests of Reypore and Manbhum) to Buddongunge, in Hoogly, passes in the dry weather on carts parallel to the Selye River, in the north of the district." The

timber was sold at various towns and weekly "hâts" or fairs throughout the division, the Collector of Birbhum stating that "the price of a cubic 'hath' of sâl would probably cost R.1, and a 'moul' piece 8 annas."

Firewood was said to be cut from "young sâl trees" and other species in the forests of the division. No special areas were set apart for this provision. The forests in the neighbourhood of Midnapur belonging to a "zemindar" had been leased to Messrs. Watson and Co., who worked them for fuel. These tracts, the Collector said, "are not capable of producing large timber." The price of firewood varied from 2-3 annas per "maund." Throughout the division the villagers either cut firewood without payment or paid a small fee to the owners of the forest. In Messrs. Watson's lease they had to pay 2 annas per cart and 6 pice per bullock for the privilege of cutting firewood.

On the subject of Government leasing areas of forests in the division for conservancy purposes, the Collectors generally considered that there were no forests worth the leasing—a point of view which perhaps is not surprising in the total absence of all conservancy in the district and the evident ignorance existing as to the objects to be attained from such conservancy. Only in Midnapore was there any kind of "jhuming" carried on in the forests, which is described by the Collector as follows: "The practice obtaining in this district regarding the cultivation of forest land is, that a certain portion is let out on a perpetual lease at a small and progressive 'jumma,' to be held rent-free for the first three years." This, however, was not shifting cultivation in its true sense. Captain Swaine, Executive Engineer in the Midnapore District, gave some interesting information anent the timber trade in the district in which he said the investments of dealers was roughly calculated at two lakhs of rupees, indicating the importance of the trade. Swaine also mentioned the trade from the Morbhanj and other forests outside the division, which he said were rich in timber at that time. In connection with the fuel supply he stated that in some of the scrub jungles the roots were grubbed out and converted into charcoal. The timbers considered of value were the sâl, "peasal" (beejasal), (*Pterocarpus Marsupium*), tun (*Cedrela Toona*) and ebony. The prices of unsquared sâl and "peasel" logs (from 12-20 feet in length) varied from 8 annas to 13 annas per *curra* (a *curra* = $\frac{3}{4}$ inch of the diameter of the section of the butt). The prices of the squared logs

(for 20-35 feet in length) varied from Rs.15 to Rs.60 per log. The price of a "tun" log was about one and a half times and that of a log of ebony twice that of a log of sâl or "peasal." All other timbers were regarded as common, the prices of logs 12 to 25 feet in length varying from Rs 2-Rs.10 per log.

This information is of interest, since it furnishes evidence of the considerable market for timber in exact per at the period in this densely inhabited part of Bengal, and also shows that there was a demand for several different species of timber. The timber dealers either paid the proprietors of the forests a lump sum down for a tract of forest, the favourite method of those days which resulted in the ruin of so many areas of fine forest, or "paid by the log or *curra*, according to the extent of their trade." Swaine furnishes information on the subject of the transport of the material. The timber was carried by buffalo carts through the jungle "mehals" throughout the year, and by rafts floated down the Cossye River during the rains. This comprised the lines of transport from Morbhanj and portions of the Midnapore District to the markets. Timber from Roypore, Simlapal and Manbhum was sometimes brought down to Midnapore by buffalo carts along cart tracks in the Bogree "pergunnah" and down the Gurbetta road. The Seyle was not much used for transporting timber in that district.

The Nuddea Division.—Two reports on the forests in the Nuddea Division were forwarded by the Commissioner, the one from the Commissioner of the Sundarbans, situated to the south of Calcutta, and the other from the Collector of the twenty-four "Pergannahs." In view of the great development in later days of the forests of the Sundarbans and their high financial value, the Report of the Commissioner of this area (it was apparently under a Commissioner subordinate to the Nuddea Commissioner in those days) affords striking evidence of the backwardness of Forest Conservancy in Bengal at the period, and also illustrates the fact that the value of such conservancy was very inadequately appreciated.

The Commissioner wrote: "There is much valuable and valueless timber in the forest tracts called the Sundarbans. The entire area of the district is about 6900 square miles, of which about 3400 square miles have been assigned under clearance leases to grantees, who have cleared and rendered fit for cultivation about 2100 square miles, leaving 1300 square miles still in a state of nature. The unallotted forest tracts may be estimated at about 3400 square miles. The latter

FOREST OPERATIONS IN BENGAL AND ASSAM 387

tracts are the property of Government. The tracts leased to grantees belong to them under the terms of their respective leases. No Forest Conservancy exists in the forests in which the Government have the sole proprietary right, *nor does any seem desirable.*" The italics are the author's. In view of later-day developments comment is superfluous! It is difficult to understand the Commissioner's inability to realise that in the interests of the Government revenue it was high time that conservancy should be started in the face of the following information he furnishes in his Report. On the subject of the chief kinds of timber found in the Sundarbans Forests he gives the following table ;—

Names of Trees.	Average diameter in feet.	Remarks.
Gaub (?)	3 feet.	The sap extracted from it is extensively applied to native boats as a preventive against decay.
Hartukky (?)	3 feet.	The gall-nut tree ; the timber is used for a variety of purposes.
Soondree (<i>Heritiera littoralis</i>)	2 feet.	A strong wood, and used for a variety of purposes.
Posoor (<i>Carapa moluccensis</i>)	2 feet.	Used for the manufacture of native furniture.
Kaorah (<i>Sonneratia apclala</i>)	3½ feet.	Used for platforms, boxes, etc.
Kirpa (<i>Lumnitzera racemosa</i>)	2 feet.	Used in making small dinghys, etc.
Byre (? <i>Carallia integerrima</i>)	3 feet.	Used for sluices, etc.
Koroe (<i>Albizzia procera</i>)	2 feet.	} Used for posts, etc.
Aumsir (?)	1 foot.	
Gurran (<i>Cerriops Candolleana</i>)	8 inches.	} Used for posts ; bark used for tanning.
Sonalee (<i>Cassia Fistula</i>)	2 feet.	
Bhylah (<i>Cratæva religiosa</i>)	1 foot.	} Used for posts and hookah pipes.
Jeen (?)	4 feet.	
Loha Koira (?)	1½ foot.	
Phoolsee (<i>Grewia asiatica</i>)	1 foot.	
Singra (?)	1 foot.	
Choelah (?)	2½ feet.	
Kankrah (<i>Bruguiera gymnorhiza</i>)	2 feet.	

Name of Trees.	Average diameter in feet.	Remarks.
Naringah (?)	2 feet.	Used for making handles for bill-hooks and spades.
Boloe (?)	6 inches.	Used for firewood ; the inner bark has a strong fibre.
Ooreeam (?)	2 feet.	Used in making dinghys, platforms, etc.
Gaoah (?)	2 feet.	Used for native drums, picture frames, etc.

"A revenue of Rs.110 is realised on a license to collect beeswax and honey in Dullooah, Burgonah and Nultonah ; also Rs.25 for the privilege of cutting timber in Nultonah. These forest tracts are situated in the Backergunge portion of the Sunderbans.

No leases have ever been granted for cutting timber or collecting caoutchouc. The licenses referred to in the preceding reply have been granted for one year.

All the rivers in the district are used for the transport of timber cut in the Sunderbans Forests. Their name is legion. The timber is cut by wood-cutters on their own account. They have always enjoyed the privilege of doing so without any license.

The villagers have [no right whatever to cut timber or other trees in the forest, but they have always been permitted the privilege of doing so."

The Collector of the twenty-four "pergunnahs" submitted a very brief Report on the forestry question. There were no "hâts" or fairs at which timber was sold in his district. The firewood used in the district consisted of the Sunderbans species of trees and was brought from those forests. "There were no jungle tracts, excepting the Sunderbans, set apart for the supply of firewood." The average price of firewood was 3-4 "maunds" per rupee.

The Tributary Mehals, Cuttack.—There were no forests in the Cuttack Division outside the Tributary Mehals, which area was nearly all forest. The timber in this area had been described by the Commissioner in a previous communication as very valuable. It was chiefly sâl, but "sissu" grew abundantly

in parts. Anderson had already had under consideration the question of introducing some form of conservancy into the area, no attempts in this direction having been yet made. The "mehals" were, however, only under superintendence. The Rajahs were supreme over their forests, were jealous of interference, and the authority of the British Government at that time was limited in this area. The Tributary Mehals were known as the Gurjhat and the only officer exercising authority on the part of the Government was the Superintendent, acting under the Commissioner's orders. The extent of the forests was unknown and no revenue was derived by Government from them, nor had any leases been given out.

There are three rivers in Cuttack, the Mahanadi and its tributaries and two others; three others in Balasore and two in Puri. "All these rivers rise in the high forest lands to the west, which border the west shore of the Bay of Bengal and the Sambalpur and Central Indian Provinces; they are almost dry by December and subject to excessive and dangerous floods in August and September, which subside again quickly." Timber cut in the Tributary Mehals was floated down these rivers; the chief part was sâl with some "sissu," and other species of timber were occasionally sent down for sale either at the ghâts (landing stages) on the river bank or in the markets in the towns.

The following statement shows the prices of the various timbers sold at the ghâts and markets:

Saloon (?) and peasal (*Pterocarpus Marsupium*),
24 feet long and 1 foot in diameter, Rs.8.

Saloon and peasal, 21 feet long and 1 foot in diameter, Rs.6.

Saloon and peasal, 18 feet long and 1 foot in diameter, Rs.5.

Saloon and peasal, 10½ feet long and 1½ feet in diameter, Rs.7.

Saloon and peasal, 10½ feet long and 1 foot 3 inches in diameter, Rs.5.

Saloon and peasal, 10½ feet long and 1 foot in diameter, Rs.3.

Sissu (*Dalbergia Sissoo*), 10½ feet long and 1½ feet in diameter, Rs.8.

Sissu, 10½ feet long and 1 foot 3 inches in diameter, Rs.7.

Sissu, 10½ feet long and 1 foot in diameter, Rs.5.

Gomohuree (*Gmelina arborea*) and kooroom (?)
10½ feet long by 1½ feet in diameter, Rs.4.

Gomohuree and kooroom, 10½ feet long by 1½ feet in diameter,
Rs.3.

Gomohuree and kooroom, $10\frac{1}{2}$ feet long by 1 foot in diameter, Rs. 2 $\frac{1}{4}$.

Bandhun, pitakoro, ussun, kosee (*Bridelia retusa*), goowa, etc., valueless timbers, 12 inches by 6 inches, Rs. 1 $\frac{1}{2}$.

Bandhun (?), pitakoro (?), ussun (*Terminalia tomentosa*), kosee, goowa (? *Areca Catechu*), etc., valueless timbers, 10 inches by 6 inches, R. 1.

Bandhun, pitakoro, ussun, kosee, goowa, etc., valueless timbers, 8 inches by 6 inches, 12 annas.

Bandhun, pitakoro, ussun, kosee, goowa, etc., valueless timbers, 8 inches by 4 inches, 8 annas.

Firewood was generally sold at 2 annas a "maund" and consisted of brushwood and branches brought into the markets for sale. There were no tracts set apart for firewood. The price had been as high as 6 annas per "maund" in the "sudder" station of Cuttack; "it has increased lately," wrote the Superintendent, "together with the price of all necessities; the cause is said to be the great influx of Europeans and workmen connected with the Indian Irrigation Company, and the extensive embankment undertakings now in progress. It does not appear that the villagers have rights for cutting wood, but in most places custom has given them a permissory right, and no one seems to prohibit it, except in a few 'mehals,' where the Rajahs appear to levy a tax of 6 pie (half an anna) on each bullock-load of firewood brought from the forests. Our interference in such petty matters in the Tributary Mehals is prohibited, and no enquiry into the details of such arrangement would be consonant to the terms of management on which these territories are supervised by the British Government." And he wound up by stating that "there are no estates to which conservancy might be applied." On the subject of Government obtaining leases of some of the forests, the Superintendent added: "As the Commissioner remarks, the Rajahs are jealous of interference, but they are also fond of gain, and there is no reason to suppose that they would refuse to supply timber to any contractors who would treat them properly and refrain from annoyance to the inhabitants, and offer sufficiently attractive prices for timber. I fear they are not sufficiently advanced to appreciate the value of preserving their timber if they could sell it. Nature at present has thrown great difficulties in the way, and till European demand for timber comes to the districts the forests are likely to remain

in much the same state as at present. The timber is valuable, but the authority of Government is limited at present in such localities. Almost all the forest land," he added, "in the property exclusively belonging to Government had been cleared for agriculture, and in all these instances the disappearance of the forest has been permanent."

The Chota Nagpur Division.—The districts in the Chota Nagpur Division at this time were Lohardugga, Hazaribagh, Manbhum and Singbhum. In forwarding the Reports of the Deputy Commissioners of these districts the Commissioner says: "I much regret that the information generally is so vague and unsatisfactory, but in the absence of surveys it could not well be otherwise. The survey of the Hazaribagh District is indeed complete, but the Surveyor reports that he has not met in that district with forest tracts worth preserving.

There are doubtless sâl forests in Palamow which are worth preserving, and I have given instructions to the Revenue Surveyor to survey such tracts where extensive, and found in estates the property of Government, in separate blocks, with a view of their being excluded from the settlement that may be made of the cultivated lands, and I will take care that, in effecting these settlements, provision is made for their preservation, but new roads must be opened before the Palamow timber can be made much use of.

The forests in the Manbhum District all belong to 'zemindars' under the perpetual settlement; the most valuable, all those that were near great highways or rivers, have been broken into for the supply of sleepers and other demands of the railway and Department of Public Works, and the only fine timber now remaining is in the less accessible parts of the district, from which, at the present prices, or in the present state of roads and communications, the carriage of timber does not pay.

In Chota Nagpur proper there are still great stores of sâl forests, but remotely situated, and therefore not as yet utilised. They will become of importance as the more accessible forests are exhausted, and I am endeavouring to induce the 'zemindars' to take measures for preserving them.

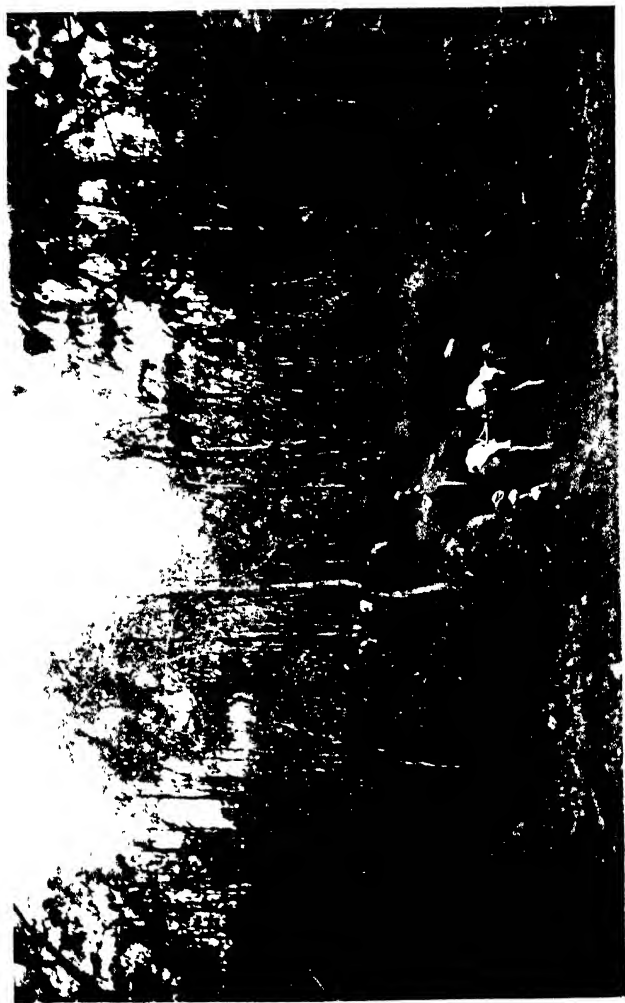
In the hill tracts, called Sarunda, of the Singbhum District, there must be several hundred square miles of forest, chiefly sâl, which is at the disposal of Government, and there are other forests in the hill-tracts of Singbhum, also at the

disposal of Government, but all so remote that no precautionary measures, even for their preservation, are yet called for."

The author can speak at first hand on the Singbhum Forests, having joined the forest division of that name, subsequently inaugurated, some thirty years after the Commissioner wrote the above. They were still practically untouched, a railway having only recently been driven through the heart of them. During nearly two years spent as an Assistant Conservator in the division the author became intimately acquainted with the great sâl forests of the district, and spent many days examining the tracts on the Sarunda (or country of the seven hundred) Hills and incidentally in tracking bison over their hot and, in the upper parts, stony slopes. Two years later the old mature trees (the excess growing stock), many of enormous size growing on the river terraces in the valleys of this region, were cut out and converted into sleepers for a railway in the North-West Provinces, the writer being in charge of the division for a considerable portion of the period it took to accomplish this work. The Commissioner therefore wrote prophetically when he alluded to the future importance of these forests in 1864. He continued: "In the Tributary Mehals under me, still more remote, there are immense magazines of timber stored up for future years, chiefly sâl. The Chiefs would be very glad to take measures for preserving them if we could make it clear to them that it was to their advantage to do so; but all that it has appeared to me necessary as yet to direct is, that persons employed in extracting resin from the sâl trees should be required to do so by incisions not likely to prove injurious to the trees."

The following is a summary of the interesting information supplied by the different Deputy Commissioners of the four districts:

Both the Government and private forests of the Lohardugga District were said to contain valuable timber, the Deputy Commissioner being of opinion that the former might be preserved and managed with advantage, and that it was desirable that some arrangement should be made in the private forests to the same end. As the tracts had not yet been surveyed it was impossible to give the areas of the forests or any details with reference to cutting and extracting the timber. It was reputed that there were no existing roads and that water carriage was not available. No Forest Conservancy had yet been attempted, nor were any leases granted for cutting timber.

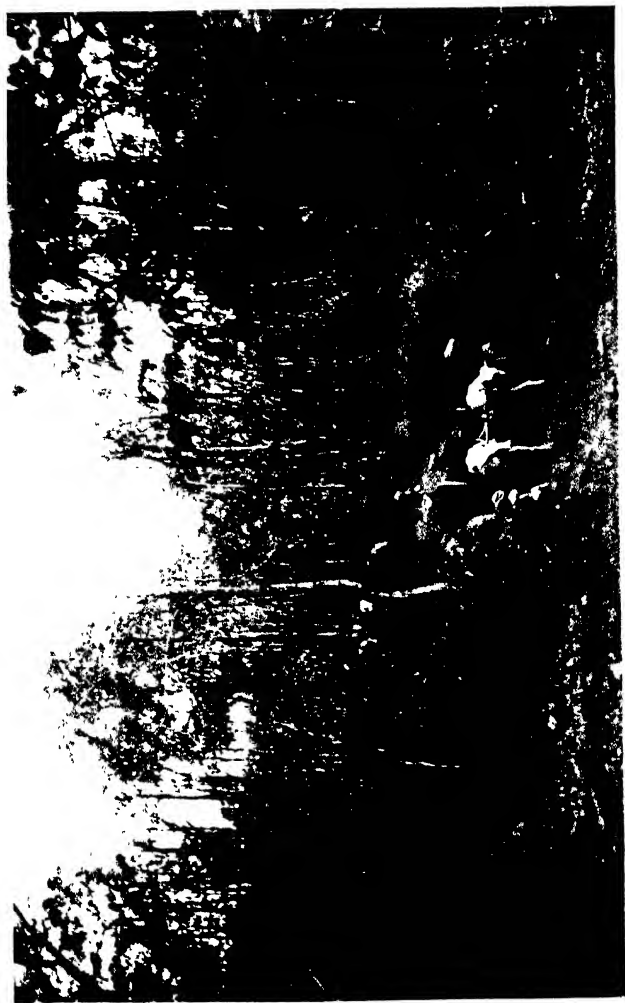


SINGBIUM SAL FOREST, CHOIA NAGPE, TYPE OF ROUGH M. D. OR ROCK EXPORT ROAD
THROUGH FOREST, A BULLOCK SADDLE LOADED WITH SHEEPERS TAKING THE DECEITLY INTO THE
SITTA AT 1111 FROM THEIR ORDINARY FIVE IS A WALK—A SLOW ONE! 1897
Photograph by author

the whole of Chota Nagpur were the asan (*Terminalia tomentosa*), 3 species of *Ficus*, *Eugenia*, *Diospyros*, *Strychnos*, *Bassia*, Kusam (*Schleichera trijuga*), *Melia*, sissu, semul and sâl. At the extreme end of the district, on the borders of the Manbhum District, the Damoodhur River was used for transporting timber, logs of sâl "asan" and "tun" being floated from the forests in the vicinity of the Jhalinga Range of hills and from Chota Nagpur. The average price of fuel was 10-12 "maunds" the rupee. The villagers possessed the right to cut fuel and bamboos, but had to pay a small tax to the owner on every 1000 bamboos cut. Both the Maharajah of Ramghur and the Rajah of Koondah possessed very valuable forests, but the Deputy Commissioner expressed himself as very doubtful whether the former would entertain any suggestion with reference to leasing his forests. The attempt had been made by Major Briggs, Executive Engineer, in 1862, but the plan fell through owing to the innumerable under-tenures and conflicting claims which it was found impossible to reconcile. "As regards the Rajah of Koondah," said the Deputy Commissioner, "I fear the youth is too much of a Tory to alter any established customs, and that he would refuse any lease except one giving him an immediate and large increase of revenue."

The Deputy Commissioner of Manbhum wrote that "there are no large forest tracts in my district which it would be desirable for Government to purchase." Captain Macdonald had surveyed part of the district and had met with no large timber. The greater portion of the forests consisted of sâl trees. They were all private property. About Parisnath there were extensive forests belonging to the Toondce Rajah, but the best timber had been cut out for railway sleepers. The Deputy Commissioner drew attention to the fact, however, that there were tracts of forest belonging to many "Ghatwalee mouzahs." He did not know whether these forests were valuable, but he said that hitherto the Ghatwals appeared to have done as they pleased with the timber, etc., growing in these forests; they had, however, no right to cut a tree in them, "as their interest in Ghatwalee 'mouzahs' is simply the right to benefit of yearly mesne profits in lieu of pay." He therefore proposed, if the Commissioner agreed, to forbid the cutting of timber in these areas, and if found valuable it would be advisable to take steps for their preservation.

The Damoodur River was the principal one used for floating



SINGBIUM SAL FOREST, CHOIA NAGPE, TYPE OF ROUGH M. D. OR ROCK EXPORT ROAD
THROUGH FOREST, A BULLOCK SADDLE LOADED WITH SHEEPERS TAKING THE DECEITLY INTO THE
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intersecting the district, varied from 2 annas to Rs.2 a pole. The Dacca and Mymensing fuel supply was also obtained from this "guzaree" forest, the Mymensing supplies being supplemented by trees "from what were formerly orchards in the ruined town of Sonargong." The price was about Rs.15 per 150 "maunds" of green and 100 "maunds" of dead material. The villagers possessed no rights to cutting firewood. On the question of the practice of shifting cultivation the Collector wrote: "Such a practice is prevalent in the jungles on the north of this district among the Choaches, Madras, Rajbunsees and other Bunnoons. Such a cultivation has not seriously injured the forest, as it is very partial and the forests are of little value."

In the Backergunge District the only tracts of forest land lay in the part of the Sunderbans Forest area which fell within the boundary of Backergunge. For information on the Sunderbans Forests the Collector therefore referred the Conservator to the Report of the Commissioner of the Sunderbans. The firewood used was chiefly "sundri" (*Heritiera*) wood from the Sunderbans, but it was supplemented by cuttings made in the stunted tree vegetation (such as "anshar" (? ashna, *Terminalia tomentosa*), "tetoool" (? *Stereospermum*), which grew in the Backergunge District. The price varied from 3 to 5 "maunds" per rupee.

The Collector of the Mymensing District reported that there was no valuable timber in his district and no Government forests. There were certain privately owned tracts "containing such wood as 'guzallee,' botanical name unknown," in the different "pergunnahs," their extent being unknown. Government had no rights in these tracts, and therefore obtained no revenue from the forests; although the "zemindars" received small sums by giving permission to cut wood in these areas. Firewood fetched 4 annas a "maund" in the district. The villagers possessed no rights to cut firewood or bamboos free in this district.

There were no Government forests in the Furreedpore District. The only information given by the Collector of the district was on the subject of fuel. This was obtained from "jhao" (? *Terminalia tomentosa*) and other trees; the former was grown on the "churs" in the River Pudma and the latter in the villages. At Furreedpore civil station the average price of firewood was 6 annas a "maund."

Considerable and valuable forests were reported to exist in the Sylhet District proper, situated in a large number of

"pergunnabs." The probable extent of these forests could not be given until the survey operations, then being undertaken, were concluded. In the Jynteah (Jaintia) area, which was not included in Sylhet proper, only approximate information as to the area of the forests could be obtained "by indicating the triangulation area recorded by Colonel Thuillier in his survey map of that portion of the country."

About half the area of forest in Sylhet proper belonged to Government and all the Jaintia Forests. "No kind of Forest Conservancy," said the Collector, "existed in the Government forests. Parties settling for these forest tracts on cultivation leases are altogether uncontrolled in the disposal of the timber to be found thereon."

Little sâl, if any, existed in the forests. The trees consisted of "ratah" (*Garcinia Xanthochymus*), "koorta" (?), "chaum" (*Artocarpus Chaplasha*), "nagesar" (*Mesua ferrea*), "taloo" (?), "ping" (*Cynometra polyandra*), "jarul" (*Lagerströmia Flos-Reginæ*), "koorma" (?), etc. The trees were cut into planks and posts and sold in the neighbouring markets. No Government revenue was obtained from the considerable trade in timber which was carried on, and no leases had ever been granted for cutting timber or collecting caoutchouc. The rivers of the district were used for floating timber and bamboo rafts from these forests as well as from forests situated in Cachar, Tipperah and Churapoonjee. Eight centres existed in the district at which timber was sold. "Jarul" fetched the highest price, Rs.20 a piece or log being quoted, "nagesar" Rs.2, and other species from Rs.5 per log downwards. Firewood presented no difficulties in Sylhet. It was abundant; the best kinds were sold in the Sylhet station at 4 "maunds" for the rupee, inferior kinds at 5 "maunds" per rupee. In the "pergunnabs" Bagauth, Dacca Duckin, Otturgatch and Kushbah Sylhet, situated to the north of the civil station, the villagers possessed the right of cutting firewood and bamboos in the forest land within their village boundaries. This right appeared in some instances to be a hereditary one, in others to have been acquired by settlement. The practice of "jhuming" existed in the Tipperah Hills, "exactly of the nature described in the Forest Conservator's letter," alluding to the Madras practice. On the subject of the possibility of areas of forest being leased by the Government, the Collector wrote: "The hill forest tracts belong to several 'meerasdars' and produce

'no valuable timbers, and hence conservancy cannot, I imagine, be advantageously applied to them. The 'meerasdars' can, however, be induced to lease their forest tracts to Government, if the latter be desirous to have them, to improve the supply of timbers in the district and of introducing a proper system of Forest Conservancy."

The Report on the Cachar District Forests is one of the most interesting, if we except perhaps that of Chota Nagpur, of those submitted by the Commissioners of Bengal. It was written by Captain R. Stewart, the Deputy Commissioner. Some attention had as a matter of fact been paid to the Cachar Forests many years before this date. In the *Jour. Asiatic Soc. Bengal* (No. 7, July, 1832, p. 305) an interesting note on the "Timber Trade of Cachar" was given under the initials "T.F." This record of the position in 1832 is reproduced here :

"Timbers sold in Cachar are divided into three kinds, called 'gúndah' 'dúm,' and 'kari.' 'Gúndahs' consists of 'jarul' only, and are used chiefly in Sylhet for boat building. They are sold at two rates, according to their size. Those timbers which are less than 10 *haths* in length and 6 'múts' in circumference are called 'pyah,' and are worth about Rs.27½ each on an average ; but those above that size are sold by the *khali*, which is a measure derived from a rude and inaccurate mode of estimating the cubic contents of the timbers, in which they are assumed to be regular parallelipedons, thus : 10 'haths' by 6 'múts' by 6 'múts', 360 parts, of which 250 make a 'kháli'; the value at present of which is about Rs.3 6 annas. Six 'múts' make a hath, and the 'hath' is equal to 20 inches.

The following table includes various kinds of timbers used chiefly for posts, beams and small boats. The prices of these are in proportion to their size, but may be stated just now as here given :¹

Nagesar (<i>Mesua ferrea</i>)	} 25 'haths' by 3½ 'haths' in cir., from Rs.10 to Rs.12 each.
Cham (<i>Artocarpus Chaplasha</i>)	
Awal (<i>Cassia Auriculata</i>)	
Teylo (?)	} 25 'hauts' by 3½ 'hauts' in cir., from Rs.9 to Rs.11.
Sunid (?)	
Morye (?)	
Gandru (<i>Randia dumetorum</i>)	
Gamer (<i>Trewia nudiflora</i>)	

¹ In this chapter the scientific names of the trees mentioned have been added by the author where traceable. Considerable assistance has been very kindly afforded by Professor Wright Smith and his staff at the Royal Botanic Garden, Edinburgh.

FOREST OPERATIONS IN BENGAL AND ASSAM 399

Silratta (? <i>Dichopsis polyantha</i>) .	} 25 'hauts' by 3½ 'hauts' in cir., from Rs.8 to Rs.10 each.
Sepai (?) .	
Gandi (<i>Muraya Königii</i>) .	
Jam (<i>Eugenia grandis</i>) .	
Chika (<i>Morinda tinctoria</i>) .	

'Kari' consists of smaller trees running from 9 to 12 'haths' in length, which are sold in lots at from 1 to 1½ 'cawns' per 'hath,' measured on the girth. The following are included in this class :

Ratta (*Garcinia Xanthochymus*), pumar (?), karil (? *Vitex leucoxylon*), kurta (?), joki (*Bischofia javanica*), singra (?), chanti (?), singtajah (?), singdrine (?), haris (?), puari (?), and many others.

Rattans (*Calamus*), 'jali bét' (*Arundinaria elegans*), Rs.7 per 100 'muras' (of 75 'béts' each). 'Súndi bét' (*Calamus Guruba*) one quarter higher.

'Gala bét' (*Dæmonorops Jenkinsianus*), the larger kind running from 80 to 120 feet in length, is unsaleable, and therefore only cut to order.

The prices above mentioned are now current in Cachar ; in addition to which the following duties are charged on the transit of the different articles to Sylhet :

On 'gúndahs,' 2 annas 6 pies ; on 'dúms' and 'karis,' from 6 annas to R1. each ; 'rattans,' from Rs.2 to Rs.3 per 100 'murahts.'

The expense of floating the timbers from the forest to Banga is about R1 annas 4 per score, and about the same sum is charged for conveying them to Sylhet ; but this expense is more than compensated by the sale of the bamboos given gratis by the wood-cutters to form the rafts.

As 'jarul' is used only in Sylhet, for the construction of large 'chunam' boats, the trade in that article has fallen off greatly of late, in consequence of the stagnation in the lime business, and the annual demand therefore does not now exceed two thousand timbers, which is about one-half the number formerly exported.

From 1500 to 2000 'dúms' and 'karis' form the amount exported of those classes.

'Jarul' is seldom carried beyond the district of Sylhet in logs, in consequence of the difficulty of floating the timbers across so large a river as the Megna ; it is sometimes exported

in planks, but more commonly is worked up at Azmeri-ganj, Chattak and Sanam-ganj into boats, for which, on account of its buoyancy, it is eminently fitted.

A 'jarul' boat well smeared with 'bélah' will last with occasional repairs about 10 or 12 years, and one of twelve hundred 'maunds' burthen may be built in Cachar for about Rs.350. Of the trees sold as 'dúms' and 'karis,' there are many which are very strong and durable woods, fit for building and furniture, but which have not yet been introduced to a fair market in consequence of the want of enterprise and capital of the traders.

It is further probable that, as the forests have never been thoroughly examined by any intelligent European, we are still ignorant of many valuable productions which they contain. Besides the 'oak' and 'tún,' 'chumal' (well fitted for furniture), wild nutmeg, cinnamon and clove trees have, it is said, been seen in them."

This record of 1832 is of interest when compared with the Report now to be considered.

Captain Stewart, in his Report on the forests of his district, stated that the district contained magnificent forests of an almost tropical character, similar in many essentials to the great forest belt stretching south from Cachar through the Lushais, the Chittagong Hill Tracts and Chittagong, a belt not mentioned at all in the Reports on the Bengal Forests at this period, but with which the Cachar Forests are conterminous.

"The entire north portion of the district," says Stewart, "being the southern slopes of the Burrail Range of mountains, is forest clad and contains both valuable and valueless timber in great abundance. This tract is not divided into 'pergunnahs'; all the valuable timber in the vicinity of mountain rivers down which it can be floated has been exhausted.

The entire south of the district, or northern slope of the Tipperah range of hills, is forest of the same nature, the hills not being so high.

Small patches to the south of the north forest, and the north of the south forest, belong to planters; the rest is 'khas.'"

No Forest Conservancy existed in the district "save as to the right to trap elephants and tap the india-rubber trees."

The native name of the tree commonest in the forests was

"jakoora"; it was worthless except for fuel purposes, but was estimated to occupy about one-third of the area of forests; probably another third was occupied by worthless trees, the remaining third consisting of valuable trees. "Jarul," "nagesar" (called "nahor" in Assam) with a large number of the associate trees usually found in this region occurred in the forests.

The "nagesar" (the Bengal name) or "nahor" is a beautiful tree formerly much planted by Buddhists. Trimen mentions that it was often planted near Buddhist temples. S. E. Peal, in *Ind. Tea Gazette*, writing of its frequency in Assam, where it was probably frequently planted in Burmese (i.e. Buddhist) times, says: "The forest, if properly studied, often yields information of a peculiar kind: thus the 'nahor' gives a clue to the density of population compared to what we see now. The large, old and crooked branching 'nahor' trees clearly indicate that when young the country, now forest, was then open. They are often seen along the sides of old 'brends' (embankments) in dense forest, and evidently planted, and from the seed the surrounding 'nahor' forest has sprung up, and it is generally as straight as the old trees are the reverse." Gamble mentions that the tree is planted about Buddhist monasteries in Burma, and is also held in great estimation by Hindus. He adds: "The timber is very strong, hard and heavy, and it is just its weight and hardness, and the difficulty of extracting it from the forest and converting it, that leads to its comparatively little use. It gives good sleepers, as good as 'pyingado' (*Xylia dolabriformis*)."

Stewart enumerates the native names of forty-three species of trees growing in Cachar.

"The revenue was derived by establishing a customs 'ghát' on the river, at which all rafts being floated down have to pay duty for each timber, etc. A lease has been offered of these forests embracing the right of tapping for india-rubber only; the annual amount produced being supposed to be between 5000 and 6000 'maunds,' but no farmers offered. This right is still conserved."

The revenue and expenditure on account of the Cachar Forests for the quinquennial period 1860-61 to 1861-5 was as follows. The revenue was collected by farming out a customs "ghát" where the duty on timber coming down the river was collected:—

Year.	Revenue.	Expenditure.
1860-61	Rs.12,300	—
1861-62	15,000	—
1862-63	15,000	—
1863-64	10,700	—
1864-65	8,000	—

The "ghát" revenue farmer had to pay the amount of his lease in two instalments and was bound by the conditions of the lease, which prescribed the way he should measure the timber in the rafts, the produce brought down on the rafts, such as cotton, thatching grass, reeds, etc., being free of tolls. No boats passing down the river were to be stopped or searched. In case of disputes in measuring rafts the matter would be settled by the Collectorate. Bamboos required for *bona fide* personal use were to be allowed to pass down free; rafts of bamboos carrying down thatching grass were to be charged at Rs.2 per 1000 bamboos.

The above allusion to the fact that the cotton bales were transported down the rivers on the log rafts is of interest, since at a later date, if not at the period here dealt with, the bales were often used for smuggling down prohibited or dutiable articles. Opium was smuggled in this way, and in the author's time in Chittagong elephant tusks had been known to be hidden in the interior of the bales.

The following was the rate of tolls leviable at the Sealtekh customs ghát in 1863:—

ARTICLES.	Duty.		
	Rs.	a.	p.
Jarul timber, each under 12 haths (1 hath=20 inches)	1	0	0
Jarul timber, from 12 to 20 haths, each	2	0	0
Jarul timber, above 20 haths, each	4	0	0
Jarul planks, posts, tirs, etc., each	0	1	0
Doom and Karia timbers, under 12 haths, each	0	8	0
Doom and Karia timbers, from 12 to 16 haths, each	1	0	0
Doom and Karia timbers, from 16 to 20 haths, each	2	0	0
Doom and Karia timbers, from 20 to 24 haths, each	3	0	0
Doom and Karia timbers, above 24 haths, for every 4 haths	1	0	0
Planks, etc., of other timbers, each	0	0	6
Bamboos, per 1000	1	0	0
Jalee and soondi rattans, per 100 bundles	1	8	0
Gulla rattan, per 100	2	0	0
Bamboos for constitution of rafts, per raft	2	0	0

No leases had been given out for cutting timber in the forests. Anyone had the right to cut either timber or firewood in the "khas" forests, the prescribed duty being paid at the customs station where it was exported. The price of firewood was 2-3 annas a "maund." The Borak River and its numerous tributaries were used to float down the rafts. The Borak itself flowed through the southern forests and much timber was floated down it, both from Manipur on its right bank and Cachar on its left.

The chief timber markets were at Soonai Mook, Burkhola, Bundookmara and Sealtek. The following statement (p. 404) of the prices in force in 1863 in these markets for the various timbers in different size classes is of interest, since it proves that the fellings in the forest were being carried out without any respect to a girth limit.

Stewart concluded his valuable Report by stating that "'jhum' cultivation is in full sway, and is the greatest enemy of the timber. Tea cultivation has also cleared much of the forest."

It will have become obvious, from the foregoing description of the position of the forests in Bengal, that the officers of the civil administration, with a few exceptions, were not as alive to the necessity of introducing Forest Conservancy into the Province as had become the case in other parts of India.

There is a curious lack of any mention of the forests of Chittagong District, the Chittagong Hill Tracts and the Lushai Hills. This is probably attributable to the same cause which confines the description of the Assam Forests to Sylhet and Cachar. The great mass of the forests of the extensive tract of country comprising the Naga and Manipur jungles which stretch southwards through the rough forest-covered tableland of the Khasia and Garo Hills and still further south into the Lushai Hills, the Chittagong Hill Tracts and Chittagong District to the sea-board was at this time an unknown country peopled, with the exception of the Chittagong District, by wild aboriginal tribes.

A Memorandum dated 3rd February, 1867, written by Cleghorn whilst officiating Inspector-General of Forests during Brandis' absence on furlough in Europe, reviews the Forest Administration Report of the Lower Provinces, Bengal, for 1865-6. This was the second Progress Report of the Forest

Timber.	3 Feet in Circumference.	6 Feet in Circumference.	8 Feet in Circumference.	10 Feet in Circumference.	12 Feet in Circumference.	15 Feet in Circumference.	18 Feet in Circumference.	20 Feet in Circumference.
Juarul (<i>Lagerstromia Flab-Reginae</i>)	Rs. a. p. 6 0 0	Rs. a. p. 30 12 0	Rs. a. p. 44 4 0	Rs. a. p. 62 4 0	Rs. a. p. 76 8 0	Rs. a. p. 126 0 0	Rs. a. p. 158 0 0	Rs. a. p. 187 2 0
Nagassar. (<i>Mussa ferrea</i>)	1 0 0	4 0 0	16 0 0	28 0 0	42 0 0	72 0 0	118 0 0	158 0 0
Silindha (<i>Silindha</i>)	2 0 0	12 0 0	18 0 0	26 8 0	40 0 0	55 0 0	72 0 0	82 12 0
Silindha (<i>? Trenea</i>)	2 0 0	10 0 0	15 12 0	26 8 0	40 0 0	55 0 0	72 0 0	75 4 0
Silindha (<i>? Gmelina</i>)	2 0 0	10 0 0	15 12 0	26 8 0	40 0 0	55 0 0	72 0 0	75 4 0
Ruktapona	1 8 0	16 0 0	17 0 0	24 0 0	32 0 0	45 0 0	60 0 0	72 14 0
Rungi Ratta	1 8 0	16 0 0	17 0 0	24 0 0	32 0 0	45 0 0	60 0 0	72 14 0
Cham (<i>Ardisia</i>)	0 8 0	4 0 0	6 0 0	23 4 0	24 0 0	40 0 0	60 0 0	72 14 0
Kattal (<i>Ardisia integrifolia</i>)	0 8 0	4 0 0	6 0 0	23 4 0	24 0 0	40 0 0	60 0 0	72 14 0
Pradol Gamair	1 12 0	9 0 0	14 0 0	23 4 0	36 0 0	50 0 0	64 0 0	70 14 0
Ratta	1 8 0	8 0 0	12 13 0	16 9 0	24 0 0	32 8 0	42 0 0	43 3 0
Karol (<i>? Karol Albisia procera</i>)	1 8 0	8 0 0	12 13 0	16 9 0	24 0 0	32 8 0	42 0 0	43 3 0
Ruktachundun	1 0 0	7 0 0	12 3 0	18 0 0	24 0 0	32 8 0	42 0 0	43 3 0
Ping (<i>Cynometra polyandra</i>)	0 8 0	4 0 0	5 4 0	7 7 3	10 0 0	15 12 0	18 0 0	20 0 0
Awal (<i>Cassia auriculata</i>)	0 8 0	4 0 0	5 4 0	7 7 3	10 0 0	15 12 0	18 0 0	20 0 0
Maral (<i>? Malak Shorea asameica</i>)	0 8 0	4 0 0	5 4 0	7 7 3	10 0 0	15 12 0	18 0 0	20 0 0
Maral (<i>? Tremitia Chabula</i>)	0 8 0	4 0 0	5 4 0	7 7 3	10 0 0	15 12 0	18 0 0	20 0 0
Maral (<i>? Wrightia tomentosa</i>)	1 0 0	3 0 0	5 4 0	7 7 3	10 0 0	15 12 0	18 0 0	20 0 0
Jalla (<i>? Wrightia tomentosa</i>)	1 0 0	3 0 0	5 4 0	7 7 3	10 0 0	15 12 0	18 0 0	20 0 0
Goondral (<i>Cuscutum glanduliferum</i>)	1 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Soondri	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Telor (<i>? Telor Drimys fur racemosa</i>)	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Jam (<i>Schinus Wallichii</i>)	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Begur Hoora	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Begur Hoora	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Ke-naga	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Sootrung	0 8 0	2 0 0	3 2 0	6 0 0	8 0 0	12 8 0	15 0 0	16 9 0
Coala (<i>Sterculia alata</i>)	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Coala (<i>? Chalta, Dillenia indica</i>)	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Kudum (<i>Amorpha Cadamba</i>)	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Doje	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Samel (<i>Bombax malabaricum</i>)	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Samel (<i>Bombax latifolia</i>)	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Chamia	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Sowara	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Boowara	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Badloor	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Am (<i>Mangifera indica</i>)	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6
Jalvora	0 6 0	1 8 0	1 15 6	2 8 6 6	3 0 0	3 12 0	4 8 0 0	4 15 6 6

* Nagassar is valued more by its length than girth. These native names are spelled so curiously that it has not proved possible to identify with certainty all the species to which they refer.—E.P.S.

FOREST OPERATIONS IN BENGAL AND ASSAM 405

Department and was drawn up by Anderson, the Conservator. The operations were still confined to British Sikkim, where considerable progress had been made in several important branches of Forest Conservancy. But already proposals were being submitted to constitute four new forest divisions in the Province—Bhutan, Assam, Chittagong and Cachar, and Behar.

During the year the Conservator, accompanied by his Assistant, Mann, had traversed the Terai from the Meech River on the Nepal frontier to the Tista River which forms the boundary of Bhutan. They roughly demarcated all the forest tracts which were considered worth reserving, erecting a number of triangular-shaped masonry pillars on the boundary-lines, in some cases cutting paths along the line. In the hill territory of Darjiling, all forests above 6000 feet had been reserved, as also the sâl and "sisu" tracts in the Terai which ascended into the hills to about 3000 feet. The remainder of the Terai Forests had been made available for sale or lease through the Deputy Commissioner of Darjiling—presumably as arable land or for the formation of tea gardens which have since covered no inconsiderable area of this country.

Cleghorn's Memorandum on the Report is of such interest, showing the good commencement which had been made by Anderson in a comparatively short space of time, that it is reproduced here :

" *Reserves.*—The forest of Goom Pahar has been reserved for the local wants of Darjiling, and is managed entirely by the municipality. The remaining forests in the ceded territory have been placed exclusively under the charge of the Forest Department.

Plantations.—A nursery of temperate trees was formed at Jellapahar, in which a large number of the indigenous pines, oaks and chestnuts were raised, and also the *Eucalyptus globulus* of Australia. At Rungbee, where the cinchona plantations are formed, and the climate is more tropical, seeds of other timber trees (including *Thuja cryptomeria* (*Cryptomeria japonica*) and walnut, which last is in great demand) were sown in 1865, and the seedlings are to be transplanted this year. In the Terai a considerable number of mahogany trees were planted, partly raised from seed naturalised at the Calcutta Botanic Gardens, partly from seed imported from the West Indies. The progress of this arboricultural experiment has been so far successful, and warrants the expectation that this

most valuable timber will attain useful dimensions in the Terai. The price of this wood at Calcutta is above Rs. 3 per cubic foot.

Yield of the Forests, British Sikkim.—In the temperate forests near Darjiling the most valued timbers had become scarce, while in the vicinity of Sinchal and Jellapahar stations all trees were formerly felled for fuel without discrimination. Timber is now obtained from the Forest Officer on payment of fixed rates of seigniorage per tree; and nine kinds of timber are included in the reserved list:

First Class Reserved.—White magnolia (? *Magnolia pterocarpa*), Rs. 10; Red magnolia (*Magnolia Campbellii*), Rs. 8; Chestnut, Rs. 10; Oak, Rs. 8; Walnut, Rs. 15.

Second Class Reserved.—Oak, Rs. 6; Chilauni (*Schima Wallichii*), Rs. 6; Cherry, Rs. 4; Lali (*Machilus Gammieana*), Rs. 4.

The preservation of the woods and the increasing demand for building materials have necessarily raised the price of timber, but the use of several trees hitherto neglected has been initiated, viz., at Darjiling, the wild cherry, the maple and a species of *Phoebe*, and in the Terai, *Gmelina arborea* and four species of *Acacia*. In the Terai, the more valuable trees are also sold at fixed rates.

First Class Reserved.—Sal (*Shorea robusta*), Rs. 10; Urjun (*Terminalia Arjuna*), Rs. 8; Blackwood (*Dalbergia latifolia*), Rs. 12; Sissu (*Dalbergia Sissoo*), Rs. 8; Chilauni (*Schima Wallichii*), Rs. 10.

Second Class Reserved.—Seet (*Acacia elata*), Rs. 5; Khair (*Acacia Catechu*), Rs. 5; Amluki (*Acacia stipulata*), Rs. 4; Guya, Rs. 5; Babula (*Acacia farnesiana*), Rs. 5; Semul (*Bombax malabaricum*), Rs. 3; Bamboos per 1000, Rs. 3; Gumbir (*Gmelina arborea*), Rs. 5.

Forest Rules.—A code of rules for the better management and control of the forests of British Sikkim, framed in conformity with Act VII of 1865, was submitted by the Bengal Government, and received the confirmation of the Government of India (*Gazette*, 5th September, 1866).

Forest Operations—Temperate Forests.—A thousand sleepers were prepared of the oak, chestnut and magnolia trees. The Eastern Bengal Railway Company have agreed to take a consignment delivered at Goalundo at Rs. 3 per sleeper. Samples of nine of the best descriptions of timber have been supplied to the agents of the East Indian Railway Company and Eastern Bengal Railway Company, including a considerable quantity of magnolia and chestnut, for trial in the con-

FOREST OPERATIONS IN BENGAL AND ASSAM 407

struction of railway carriages and wagons. Five 'maunds' of dog-wood (*Cornus sp.*) have been sent to the gunpowder factory at Ishapoor, for the manufacture of charcoal. A small depot is to be formed for storing the timber of the temperate forests.

Tropical Forests.—Five thousand sâl sleepers were prepared by sawyers, and 100 first-class 'sissu' trees were felled. In April, 1865, an attempt was made to raft down sâl and 'chir' sleepers which had been prepared above the junction of the Great Rungeet and Tista Rivers (vide I, p. 516). The experiment failed, owing to the bad quality of the ropes employed in securing the sleepers to the bamboo rafts. Dr. Anderson recommends with confidence the use of strong cane (*Calamus sp.*) for binding the rafts upon the next occasion. A main depot has been formed at Silligoree, and a subsidiary depot at Sivok, for the timber to be floated down the Tista River. Sickness prevailed to a great extent amongst the working party in the Terai; thirty-two natives died before the end of the season; two European overseers were struck down by fever, of whom one died.

Financial Results.—The financial operations of the year show a deficit of Rs.13,416, thus:—

	Rs.	Stock valued thus:—		R. a.	Rs.
Expenditure . . .	28,915	1,000 sleepers,			
Receipts . . .	3,893	temperate woods,			
		at . . .	1	8	1,500
Cash deficit . . .	25,022	7,865 sâl, at . . .	1	4	9,856
Deduct value of timber		200 chir, at . . .	1	4	250
in store . . .	11,606				
		Total . . .			11,606
Annual deficit . . .	13,416				

This refers only to Sikkim, to which the operations of the year have been confined. A proposal for treating as forest receipts in the Budget all grazing dues and sums realised from squatters and fisheries within the limits of reserved forests, was sanctioned in September, 1866.

Additional Forest Divisions.—It is proposed to add four new ranges or divisions as follows: Bhutan (officer appointed), Assam, Chittagong and Cachar, Behar.

A considerable amount of forest revenue was collected in these provinces in 1865-6, by Civil Officers, and the timber and forest produce will be brought under departmental control as soon as arrangements can be made for the purpose.

Bhutan.—The proposal to appoint an officer to the Duars

came up in May, 1866, was sanctioned for one year, and was strongly recommended for confirmation to the Secretary of State. The timber of the Sikkim and Bhutan Forests is required for any extension of the Eastern Bengal Railway, and for the doubling of the East Indian Railway. It will be necessary to sanction an establishment hereafter, as these forests are of great value, and must not be given up to timber traders. Meanwhile, Dr. Anderson and his Assistant, Mr. Dale, are at this time examining the extent and position of the forests in the unknown portion of the Duars with a view to careful and systematic management. Their Report may be looked for with much interest. The total forest revenue of Bhutan in 1865-6 was Rs.4,389, and was collected without any charge.

Assam.—In Assam there is no establishment, and at present no attempt at conservancy; there is a small revenue of Rs.1,500 from miscellaneous forest produce, licenses to cut timber, and to collect caoutchouc, and it may be remarked that this is the only district in India where the gum-elastic is an article of revenue.

Chittagong and Cachar.—The total forest revenue collected by Civil Officers was Rs.26,656; the details are not given, but this considerable amount appears to indicate that the forests of the district will be worth the expense of conservancy. It is probable that on careful inspection valuable productions will be found.

Behar.—The forest revenue of this division is reported to have been Rs.2,140, chiefly in the district of Lohardagga; the collections were on account of the tussah silk cocoons, the preparation of gum catechu and the manufacture of charcoal.

General Financial Results.—The total forest revenue of 1865-6 is given in the table opposite.

Forest Staff.—The Forest Officers in the Lower Provinces at this date are: Conservator—Dr. Thomas Anderson, appointed 3rd August, 1864. Assistant Conservators—Mr. Gustav Mann (Sikkim), appointed 1st December, 1865; Mr. Dale (Bhutan), appointed 9th December, 1866."

In their No. 93, F., dated Fort William, 1st March, 1867, the Government of India expressed satisfaction with the progress of conservancy in Bengal. "Considering the difficulty of organising a Department and starting operations in the thinly peopled and unhealthy Terai districts, the progress of work in British Sikkim has been as great as could be



THE SAI FOREST ON THE GREAT RUGGELL RIVER ABOUT ITS JUNCTION WITH THE TISIA RIVER.
1500 FT. ELEVATION. BRITISH SIKKIM ON THE LEFT.
Photographed by Mr. J. J. Davis on December 11, 1902, at No. 12.

FOREST OPERATIONS IN BENGAL AND ASSAM 409

expected, and Dr. Anderson deserves credit for his preliminary investigations and classification of the miscellaneous forest produce. Though the Goom Pahar Reserve is managed by the Municipal Commissioners of Darjiling, it ought to be under the general supervision of the Conservator."

They also considered that the revenue derived from Chittagong and Cachar encouraging, and they requested the Government of Bengal to keep in view the question of the extension

Divisions.	Receipts.	Charges.
	Rs.	Rs.
Sikkim	3,894	28,916
Bhutan	4,389	—
Assam	1,499	—
Chittagong and Cachar .	2,650	—
Behar	2,147	—
Total Receipts . . .	Rs.38,586	
Direction		6,857
Total Charges . . .		Rs.35,773
		Rs.
Cash balance		2,812
Add the value of sleepers in depot .		11,606
Total Surplus, 1865-6 .		Rs.14,418

of departmental control to that district, as soon as it could be arranged.

The Secretary of State (Rev. For., No. 14, dated 8th May, 1867) confirmed the opinions expressed by the Government of India and endorsed their action in publishing Cleghorn's Memorandum, since it would tend to assist the progress of conservancy in the Province "by making known the value of their productions." The Despatch continues: "I regret to observe that great sickness and mortality prevailed among the working party in the Tista Valley, and impeded its operations. Mr. Mann's suggestion that on this account the logs should be brought whole out of the forest, and all sawing operations conducted at some miles' distance, seems to me, if otherwise practicable, well worthy of adoption. It is unfortunate that so little progress seems to have been hitherto made in providing establishments for the other divisions, without which

the forests cannot be placed under efficient conservancy, and it seems to be anticipated that much valuable timber and other productions may be drawn from them. I trust, therefore, that the hope which you have expressed to the Bengal Government, that departmental control will be extended to them as soon as it can be managed, will before long be fulfilled. I desire that a sketch map may be prepared and sent home of the Bengal Forests, showing the different divisions into which they have been formed, and the principal trees growing in them. The chief timber stations and roads should also be marked."

Great hopes were entertained at this period that mahogany plantations could be formed in Bengal, the tree having been successfully grown in the Botanic Gardens at Calcutta. Anderson had given considerable attention to this matter and had written a Report "On the Cultivation and growth of Mahogany in India," giving the measurements and known age of the trees in the Calcutta Botanic Gardens (*Vide* Supplement to the *Calcutta Gazette*, 6th February, 1866, p. 17). In forwarding this Report to the Secretary of State the Government of India wrote: "We consider that its (mahogany) culture may be extended with much advantage, particularly in Lower Bengal, Assam and Chittagong. Dr. Anderson proposes to form at once considerable plantations in the Sikkim Terai, if he can be supplied annually with seeds from the West Indies, and we solicit your good offices in obtaining regular supplies of seeds from the Government of Jamaica."

In Chittagong a plantation was subsequently commenced at Kaptai about forty miles up the Karnafuli River from Chittagong town.

It has been noticed already that at the end of two years' work Anderson asked to be relieved of the post of Conservator of Bengal on the ground that the scientific part of his duties at the Botanical Gardens were being neglected, whilst at the same time his scientific botanical work and researches had remained untouched. He wrote on the latter subject: "This herbarium is now so rich in plants from India and the Dutch possessions, and so many of the specimens have been named and collected at the Royal Herbarium at Kew, that the preparation of a complete *Flora Indica*, the desideratum of all botanists and the expense of which has been sanctioned by the Secretary of State, could be commenced here. I am assured by Dr. Hooker, to whom, assisted by Dr. Thomson, the writing of this great work has been entrusted by the

FOREST OPERATIONS IN BENGAL AND ASSAM 411

Secretary of State, that his engagements will not permit of his preparing this, and that unless I undertake it the publication will again be indefinitely postponed."

In reporting this resignation to the Secretary of State the Government of India remarked that in the first instance they had expressed a desire to have a whole-time Conservator of Forests in Bengal, but had recognised the good start in conservancy which the special knowledge of Anderson would enable him to make. These hopes had been fully justified. They felt, however, that Dr. Anderson's wish should be acceded to. They continued: "The Lieutenant-Governor asked the Government of India to select an officer for the post. As the Department in Bengal will form an important charge when the Sikkim, Bhutan, Assam, Cachar and Chittagong Divisions are in working order, we consider that an officer should be selected who had had considerable experience as Conservator of Forests in another Province. Our selection has fallen on Mr. H. Leeds, the Conservator of Forests in British Burma." The salary of the post was to be Rs.1,000, rising to Rs.1,200 when the Conservatorship had become more important. Lieutenant Seaton was to be promoted as Conservator in Burma.

The Chief Commissioner of Burma strongly opposed the transfer of Leeds to Bengal, but his objections were overruled. Leeds joined in Bengal in the latter part of 1867, the appointment being approved by the Secretary of State.

In their Despatch, No. 9, dated Simla, 12th September, 1868, the Government of India reviewed Anderson's third and last Annual Progress Report of the Bengal Forests for 1866-7. After expressing satisfaction at the progress of conservancy in the Province and expressing their thanks to Dr. Anderson "for the services rendered by him to the cause of Forest Conservancy in the Lower Provinces of Bengal," the Review continued:

"During the greater portion of the year operations were confined to British Sikkim, and towards the close of the year the forests of the Bhutan Duars were brought under the control of the Department. In the other divisions the forests remained in charge of the Civil Officers.

In Sikkim satisfactory progress appears to have been made in the demarcation of reserved forests. In the Report for 1865-6 a list of the forest reserves was given, but without a statement of their area, and with only a general indication of the character and description of the forest. To future

Reports should be appended a descriptive account of each forest reserve, giving area, boundaries, a descriptive account of the forest, and a statement of the lines of export from it. It should also be explained to what extent these reserves are under the control of the Forest Department, and whether the inhabitants exercise any rights of cultivation, cutting wood and collecting forest produce. From the remarks made under the head of conservancy, it would appear that 'jhum' cultivation was still practised in the sâl forests of British Sikkim.

It is satisfactory that an attempt has been made to bring the consumption of several valuable species of canes (*Calamus*) under the control of the Department. The measures reported to diminish the extent of jungle fires at the foot of the hills likewise deserve commendation. The progress of the mahogany plantations is satisfactory, and so is the commencement made to cultivate on a large scale in the temperate forests several species of oak, walnut and other valuable kinds. Good progress appears also to have been made in the arrangements for working the sâl forests in the Terai and the Tista Valley, as well as the temperate forests on the higher hills. The proposition to form a depot with the view of meeting the want of seasoned timber felt in the Darjiling District appears suitable.

There has been a considerable increase in the value of timber at depots at the close, as compared with the commencement, of the year. It is reported that at the close of the year there were in hand 4704 logs, 7674 sleepers and 100 planks, valued at Rs.1,19,987, against 9085 sleepers at the commencement, valued at Rs.11,606.

The general financial results of the Department are reported as follows :

	Receipts.	Charges.
	Rs.	Rs.
Sikkim	6,496	96,622
Bhutan	7,271	3,819
Assam	7,865	—
Chittagong and Cachar	28,417	220
Behar	506	—
Direction	—	3,767
Total	Rs.50,555	1,04,428

leaving an excess of expenditure of Rs.53,873.



THE SAI FOREST IN THE TIRAI AT THE FOOT OF THE PARCHING HILLS NEAR
SODNA, BENGAL

Against this stands the difference between value of stock at the commencement and close of the year, Rs.1,08,381, and the like difference on account of outstandings due to the Department, stated to have been Rs.7,452; so that the balance in favour of the year would appear to have amounted to Rs.61,960."

The Government of India also commented favourably on Anderson's statement that the plantations of mahogany were thriving and promised to be successful; and also on the fact reported "that the diminution of sickness (in the Tista and Rungeet valleys) was partly ascribed to the use of decoctions of cinchona leaves."

In September, 1866, the Government of India had called for a Report on the forests of the Western Duars and Bhutan with a sketch map of the areas. This Report was drawn up by Leeds after visiting the areas and submitted to the Government of Bengal with his letter, No. 15A, dated 19th May, 1868. The Report gives some insight into the condition of the forests of this area, which it will be remembered had been ceded to us at the treaty which ended the recent war, when conservancy was first extended to them.

The sâl forests of the Western Duars in the plains consisted of twelve blocks of forest estimated to contain a total area of 40 square miles. The workable forests in the hills were estimated to cover an area of about 50-60 square miles only, as the outer hills only were at the time available for timber operations. It was considered by Leeds as "very doubtful from the nature of the hills whether it will be practicable, even at heavy cost for roads, to bring out timber hereafter from the temperate forests of the district within the British boundary." The Report continues: "The forests on the plains bear the signs of having once been very rich in large timber, but, with the exception of the Nathabaree (No. 8), Deema (No. 10), Buxa (No. 11) and Naldabaree (No. 12), no trees above five feet in girth remain, and these four forests are only estimated to contain now some 5000 to 6000 trees above six feet in circumference at four feet from the ground. This height is taken as the most convenient in many respects for measurement. The sâl forests of the outer hills may be estimated to contain about 5000 to 6000 trees of six feet in circumference, as above measured, at four feet from the ground.

This gives from 10,000 to 12,000 as the stock yet remaining of full-sized trees in the forests available, until those of four

and five feet girth shall have become full-sized or six feet and above in circumference.

Add to this the present stock of seasoned and dead timber to be derived either from former fellings or death by natural causes now in the forests, and the thinnings which will be brought into market as the work proceeds, and we have the whole available stock of sâl to be expected from the forests of the Western Duars for a term of probably twenty to twenty-five years.

The "sissu" forests of these Duars are properly only four in number, for although young "sissu" grows scattered about along the lines of old beds of rivers, these latter can scarcely be reckoned as forests, though hereafter, if cared for, these scattered seedlings may become valuable.

The Tandoo Forests, Nos. 13, 14, 15, about three square miles in extent, contain no "sissu" trees above four feet in circumference. The Torsa Forests, about six square miles, contain perhaps from 200 to 300 trees above five feet in circumference.

The stock of this wood is therefore very limited.

No accurate data have yet, I believe, been obtained regarding the growth of "sâl" and "sissu," but supposing "sâl" to take 80 to 100 years to come to maturity, and "sissu" perhaps more, it is evident that great care must be taken of the present supplies of available timber, and that all young forests must be carefully protected."

The following species of timber trees were reported as existing in considerable quantities and of large size up to an elevation of 1000 feet, and immediately below the hills where moisture was found. *Terminalia Arjuna* (urgun), *Schima Wallichii* (chelauni), *Gmelina arborea* (gumhar), *Castanea indica* (katoos), *Acacia Catechu* (khair), *Bombax malabaricum* (semul). The first four were good for general building purposes, the fifth excellent for house posts, and the last was abundant all through the Western Duars and was much used for canoes and other domestic purposes. In addition there were other kinds of woods of inferior value useful to supply the indigenous population with all their wants along the foot of the hills, and easily removed by native carts.

Leeds then remarked on the improvident use of timber prevailing in the district.

"Hitherto in these forests, as everywhere else, most of the valuable kinds of woods being obtainable without restriction,

these only have been used for every purpose in the most wasteful way. For the smallest shed or railing of the most temporary nature, as well as for large buildings, valuable woods have been used, and the consequence is that the stock is becoming less and less every year, consumption being much greater than reproduction. The standard size of timber in use shows this very clearly, for whereas formerly the average size of timber brought out of the forests for the market and building purposes was six feet and upwards in circumference, it has gradually come down to three feet ; and even two feet timber is now eagerly sought after.

True that 'sâl' seedlings are reproduced in great abundance, and that thus planting of 'sâl' may not be considered necessary, but these seedlings are subject to many accidents, and require care to insure their final growth into large timber, and the present demand for 'sâl,' even of small size, is sufficient to prevent their ever growing over two to three feet in circumference unless protected by law.

Local requirements must become subordinate to the state of the forests and the exigencies of conservancy. The converse of this has been the position of things, and the results are obvious. If the interests of conservancy render it necessary that certain restrictions be put on the felling of certain kinds of trees, local supplies must be regulated accordingly. If 'sâl' is not available a baser description of timber must come into use, or other materials must be sought for. This will, of course, at first lead to dissatisfaction and complaints. The state of things is unfortunate. The present generation has to suffer for the errors and improvidence of the past, but better this now than that a future generation find no forests at all.

Those who sit at home at ease and do not penetrate and search the forests are apt to look upon them as inexhaustible, a common term applied to forests, though none can be more inappropriate, but the areas covered with forests are yearly being encroached upon and the contents fast cleared out, and conservancy will require the strongest support of Government to enable it to resist the pressure which will from time to time be put against the Forest Department in the shape of all kinds of complaints, which, even with the utmost care and foresight to prevent them, will always appear to have some sort of foundation and be supported by appeals to the hardships put upon the indigenous population, though these turn out to be imaginary when the matter is understood.

The produce from the forest of these districts can be easily taken down the numerous streams which, rising in the hills, intersect the plains at intervals of a few miles and flow into the Brahmaputra, down which timber could be taken to market without much difficulty, but at considerable cost.

Up to present date there can scarcely be said to have been any conservancy in these Duars.

Previous to the end of 1867, and immediately after the war, it was not considered advisable to allow any operations in the district, and since then little has been accomplished, as there are not any rules yet sanctioned under the Forest Act VII of 1865, and without these the Forest Department has no legal status.

The operations now being carried on are as follows: European contractors were placed in the Buxa Forests in February to bring out timber of six feet in girth, and all the seasoned and dead timber, of which there is a large quantity. It is proposed to take some of this timber down the river to the Calcutta market to test the difficulties and expenses attending such operations. The present stocks are probably not more than will be required yearly to meet local purposes far above Calcutta, and it may not therefore be advisable to send much to that market.

Arrangements have just been made with a gentleman settled on the Torsa River, not far from the site of the proposed new station of Palacotta, to collect all seasoned timber lying in the forests in the neighbourhood ready for use in building the new station, if required, and to meet local wants; and similar arrangements are in course of being made for the other forests, so that all available supplies may reach the local markets to meet daily requirements.

These operations will lead the way to the restrictions which will have to be placed on the cutting of reserved kinds of timber so soon as Forest Conservancy is established on a proper footing under rules having the force of law.

The present position of Forest Conservancy in the Western Duars is of the most unsatisfactory kind, and such as cannot but lead to complaints and misunderstandings.

The fear of these will be avoided in future by clearly defining the position and duties of the Forest Department, pending the passing of rules which are before Government for approval and sanction, after which no difficulties need be apprehended.

It is proposed to survey, demarcate and closely estimate the value of the forests of the Western Duars next dry season.

FOREST OPERATIONS IN BENGAL AND ASSAM 417

commencing in December, as soon as it is at all safe to enter the Terai, when much detailed and reliable information will be obtained which cannot now be given, for although the Assistant Conservator, Sikkim, visited these Duars as directed in February last, and he accompanied the Conservator again in April as far as Buxa, and has obtained considerable knowledge of the district and forests, still some of the information here given can only be looked upon as an estimate."

In their remarks on this Report the Government of India (letter, dated September 24th, 1868) made some apposite remarks with reference to the proposed conservancy work to be undertaken in the region.

"The Conservator proposes in December next to survey, demarcate and closely estimate the value of these forests. This appears to the Governor-General in Council a necessary and important measure; and I am directed to add that, in demarcating the forests, it should be considered whether, in addition to the 'sâl' and 'sissu'-bearing lands, other forests may not be included which produce some of the other valuable kinds of trees. Arrangements should, if possible, be made to secure to the Forest Department complete control over the demarcated forests, and if this cannot otherwise be done certain tracts might as an equivalent be set apart for the exclusive use of the villagers, for the grazing of cattle, the supply of timber, firewood and other forest produce.

I am to request that a statement of the demarcated State forests should be submitted to the Government of India, with a detailed plan of operations to be followed regarding them. This should contain provision for the gradual removal of the mature timber, according to a well-considered system for thinnings, the improvement of the forests by sowing or planting, and other operations. It should also be stated what is proposed to be done in the way of boundary-marks and communications, and how it is intended to provide for the protection and management of these forests by placing them in charge of subordinate local Forest Officers.

The Governor-General in Council has observed with satisfaction that it is intended to propose forest rules under Act VII of 1865 for the forests of the Duars."

The great influence which the appointment of Brandis as Inspector-General of Forests and Adviser to the Government of India exerted becomes evident owing to the recognition

and hearty support which the Government of India and the Secretary of State were now giving to the introduction of conservancy into the forests of the country and the earnestness with which they were forcing the Local Governments to press on with this important but so long neglected work. It is evident that the Minutes of the Governor-General and of the Secretary of State were written by experts. The former were doubtless the work of Brandis. It would be of interest to have been able to trace the author of the latter.

The Government of Bengal were able to report in their For., No. 2626, dated 9th July, 1869, on the progress which had been made on the above-mentioned work. Mann had submitted a comprehensive and valuable Report of a detailed inspection he had carried out of the forests of the eastern portion of the Bengal Duars from the Sunkhos River to the Monas River. This Report was submitted by Leeds to the Government of Bengal with his Letter, No. 57A, dated 5th February, 1869. The western portion of the Duars had already been reported on by Leeds, so the former Report completed the information on the Bengal Duars. The Bengal Government informed the Government of India that much discussion and difference of opinion between the local civil authorities and the Conservator had taken place in connection with the Duars Forests. The Eastern Duars Forests which were considered capable of being immediately reserved or brought under the strict operation of conservancy rules, had been demarcated by boundary-marks, and the latter had been noted on the survey maps, "advantage being taken of the circumstance that the Revenue Survey party were employed there. Copies of maps showing these are under preparation, and will be submitted in due course. A small party is now engaged similarly in demarcating on the ground, and showing on the survey maps the forests of the Western Duars." These latter forests had been the subject of Leed's previous Report referred to by the Secretary of State as above mentioned. The Bengal Government stated that the forests of the Duars had been formed into a forest division, "but as no Assistant Conservator of the regular establishment is available (being only two Assistant Conservators attached to Bengal) a Mr. Davis had been in charge for some time, on a lower salary, under the denomination of Forest Ranger." The Bengal Government stated that they were intending to ask for a larger establishment for the forests.

The writer may be allowed the opportunity of stating that he joined his first division in Bengal (Singbhum) a quarter of a century later under Mr. Davis, then the senior Deputy Conservator of Forests in the Province. Mr. Davis was subsequently transferred to Darjiling, where he died in harness. Although handicapped by the absence of early training Mr. Davis had proved himself a capable Forest Officer, who had acquired a comprehensive knowledge of many of the forests of the Province.

The weak spot in the Bengal Government's letter under reference was their statement that satisfactory progress in the Forest Conservancy arrangements could not be made until the sanction of the Government of India had been received to the set of rules which had been submitted to them. This suggestion was made with reference to a remark in Leeds' letter, forwarding Mann's Report on the Eastern Duars Forests, recommending that no tracts of forest-covered land be granted or sold without a Report on them from the Forest Department. Leeds urged this as the Commissioner of Cooch Behar in a letter addressed to the Conservator, in which he referred to the proposed forest rules, then before Government wrote: "the authority of the Commissioner to authorise the leasing out of private land to private persons is *unlimited*." The Government of India informed the Government of Bengal that it appeared that that Government had sufficient authority to prohibit, without any special rules, the lease or sale of land covered with forest, such an order being a purely administrative one. They hoped therefore that the Government would see their way to adopting Leeds' proposal.

The other point in the Bengal Government's letter which called forth remarks from the Government of India, had reference to the former Government's opinion that in all permanently settled districts (it will be remembered that in 1786 a portion of Bengal had been permanently settled under the policy of the Governor-General, Lord Cornwallis) all waste and forest lands belonged to the "zemindars." This opinion was expressed in connection with a remark of Leeds on the subject, referring to a paragraph in Mann's Report headed "Private Forests," referring to areas in the Goalpara District. The Commissioner of Cooch Behar had entered into negotiations with the "zemindars" in question with the object of obtaining a transfer of the forests in exchange for other land. In a letter dated 12th October, 1870, the Government of Bengal reported

the failure of these negotiations to the Government of India. From the Commissioner's Report on the matter it is evident that he had opened the question with extreme reluctance. He stated that the forests at no time belonged to the State and that they were the chief source of profit to their owners, who were minors; and that the owners had said it would not be profitable to give them up in exchange for other land. The Commissioner (Colonel J. C. Houghton) was, it is obvious, totally ignorant of the objects which the introduction of Forest Conservancy were desired to promote. He wrote: "I have before pointed out, when writing on this subject, that 'zemindars' in Bengal have no such care for the interests of posterity as to induce them to make present sacrifices. They would, no doubt, be glad to lease out their forests at the highest rate of profit available during their own lifetime, but more cannot, I think, be expected of them. As yet the Forest Department has done nothing whatever towards the management of the forests in the Eastern Duars, and I cannot recommend that it should undertake the management of private forests and other extraneous duties before it has entered on its own peculiar ones.

With reference to the second paragraph of your letter, I have the honour to report that I consider no doubt whatever can exist as to the forest being included in the permanently settled estates. At first the right of cutting timber was farmed out separately, apart from dues on land cultivated; these, at the time of the perpetual settlement, were amalgamated, and for seventy years no question has been raised.

The case of the Sundarbans is not at all parallel. There was an immense tract of jungle not included in, but adjoining, 'zemindaries'; such at least I understand to be the case.

Besides the Government forests in the Bengal Duars, there are very valuable forests in the Goalpara District in the hands of private people. Of these, the most important are the forests in the Purbut Jocar. These are pure sâl forests on high, level ground and, from their proximity to the Brahmaputra, easily worked and most valuable: but they contain no trees at present fit for felling, although large quantities of 'goles' (posts), as described above, are still annually removed from them.

These forests extend over about 144 square miles, and the income derived from them does not equal that to be obtained from the same area of cultivated land, and must be reduced in

a few more years to a mere trifle if the removal of posts is continued as at present. Perhaps the owners might be induced to exchange these most valuable forests for an equal area of cultivated and waste lands in the Duars. This would be the best way of saving them from certain destruction, since it can never be hoped that 'zemindars' will adopt measures of conservancy themselves, the benefit of which could not be realised for thirty to fifty years, and who in fact are too poor to adopt such a measure without present ruin, although all of them are awake to and admit the fast-approaching scarcity of timber. The area of the 'sâl' forest, together with cultivated tracts, is believed to be upwards of 250 square miles, and pays a revenue to Government of Rs.500 a year."

In drawing attention to this letter, Leeds wrote: "How such a tract became alienated to the State it is difficult to conceive, if the British Government had, at any time, authority over its disposal." The Government of India expressed the opinion that Mann's suggestion that the "zemindars" might be induced to exchange their forests for an equal area of cultivated and waste lands in the Duars might be recommended to the attention of the Commissioner of the division. The Secretary of State also expressed some concern about these Goalpara Forests and their future management.

There is an echo of difficulties which were being expressed by Forest Officers in other provinces at this period in the following remarks in the Government of India's letter:

"It was said that it should be considered whether in addition to the 'sâl' and 'sissu'-bearing lands other forests should not be included within the demarcated tracts, and it was explained that in order to secure to the Forest Department complete control over the demarcated forests generally, certain tracts might, as an equivalent for the inhabitants, whose forest rights would be curtailed, be set apart for their exclusive use.

These and other similar measures can in many cases be effected by arrangements of an administrative nature without requiring the authority of forest rules. Generally it will not be found difficult, under proper arrangements, to provide for the requirements of the villages in the vicinity of the demarcated forests; and His Excellency in Council is of opinion that if Forest and District Officers will cordially co-operate in this matter, fair and equitable arrangements may in most instances be made with the inhabitants, either by continuing to grant them their forest rights under certain rules and regulations, or

by making over to them a certain area of forest land in lieu of their forest rights.

Act VII of 1865, under which any forest rules would have to be sanctioned at present, contains no provisions concerning the regulation of forest rights, but only stipulates that the notification defining Government forests shall not abridge or affect any existing rights of individuals or communities. No rules, therefore, can be framed under this Act to facilitate the regulation of forest rights."

Progress in the introduction of conservancy in Bengal was lamentably slow and behind that of the other provinces, as is evidenced by Leeds' first Annual Report for 1867-8. The Bengal Government had yet much to learn on the subject. The Report itself was not drawn up in accordance with the prescribed rules, and was submitted nine months late, and only reached the Secretary of State at the end of January, 1870, when, as he remarked: "I ought to be in possession of the Report for 1868-9." The Report only dealt with the Sikkim and Bhutan Forests, the forests of the other divisions not having yet been made over to the Department. The yield of timber from the Sikkim Forests was 375,230 cubic feet. The felling and removal of timber from the Bhutan Duars was not controlled by the Department during the year.

Leeds had complained that the Darjiling municipality who had charge of the Ghoom Pahar Forests, were underselling the Forest Department by letting purchasers have timber at the rate of about R.1 per ton of 50 cubic feet. The Government of India in their review of the Report made the following remarks on this and other financial matters:

"If Mr. Leeds' views are correct, the exhaustion of the municipal forests appears inevitable. His Excellency in Council desires to be informed whether these forests were transferred to the municipality absolutely without any restrictions, or whether Government has retained certain rights of control and supervision, and whether this supervision should not be exercised by the Forest Department.

The financial operations of the year have resulted in a cash deficit of Rs.89,918, even after taking credit for the forest revenue realised by District Officers, the propriety of doing which, it is observed, the Government of Bengal does not admit, because the amount cannot properly be taken as a set-off against the cost of the management in Sikkim and the Bhutan Duars.



VIEW NEAR CHAKUNG, SIKKIM, 4000 FEET. WITH KINCHINJUNGA,
28,150 FEET, IN BACKGROUND. A PAHARI (HILL MAN) HUT WITH
A FIELD OF MAIZE IN FOREGROUND. MATING BAMBOOS (*L. RICK-*
MOSI) ON THE RIGHT

Photograph by Professor Wright Smith

FOREST OPERATIONS IN BENGAL AND ASSAM 423

But the Governor-General in Council observes that this appears hardly a correct view of the matter. The revenue under the head of forests should primarily include all income derived from forest lands or produce, irrespective of the precise system of supervision. But even taking a narrower view, the duties of the Conservator have begun to extend to the forests of Bengal generally. He was engaged during part of the year in examining the Chittagong Forests, and it appears evident to His Excellency in Council that all forests which have not yet been transferred to the Forest Department should be managed by the officers of the Civil Department under the Conservator's advice and with his assistance."

The financial results, including the revenue as realised by District Officers, were: Receipts Rs.75,687, charges Rs.65,605, leaving a cash deficit of Rs.89,918. The value of stock and outstandings for the year amounted to Rs.1,15,679, giving a net revenue of Rs.25,761.

The Report for the following year, 1868-9, is of considerable interest as showing a far greater progress in the Province. It was written by Lieutenant Stenhouse, as Leeds, who was in charge of the Province for the greater part of the year, had gone on leave.

The Report was accompanied by a sketch map of the Bengal Forests (including Assam). This map indicated the general limits of the proposed divisions of the Government forest tracts in Bengal, Behar and Orissa. These were as follows:

Sikkim and Bhutan Division	Sikkim Sub-Division	{ Temperate Forests.
	Bhutan Sub-Division	{ Tropical Forests.
Lower Assam Division	Gauhati Sub-Division	{ Temperate Forests.
	Goalpara Sub-Division	{ Tropical Forests.
Upper Assam Division	Lakimpore Sub-Division.	{ Temperate Forests.
	Sibsagar and Naga Hill Sub-Division.	{ Tropical Forests.
Dacca Division	Cachar Sub-Division.	{ Temperate Forests.
	Sylhet Sub-Division.	{ Tropical Forests.
Chittagong Division	North Chittagong Sub-Division.	
	South Chittagong Sub-Division.	

Other forests in Bengal not yet arranged for were the Sunderbans Forests, Palamow Forests (Chota Nagpur) and the Damin-i-koh Forests in the Bhagalpur Division.

The explanatory notes to the map showed the various blocks of forest in the respective sub-divisions and list of the trees so far as was known, matters which, in the light of present-day knowledge of these areas, it is unnecessary to deal with here. These details are all irrelevant to an Annual Report, and renders it somewhat difficult to distinguish the purely forestry work which was carried out during the year. But the remarks it contains on the Assam Forests are of great interest and value. Perhaps one of the most important was Mann's reference (he had written the notes on the Assam Forests) to the value of the caoutchouc forests in the Darrang District. They covered an area of 585 square miles, were distributed in six blocks, of which three were said to be in a very exhausted condition, the trees having been tapped to death. Rubber was an important article of commerce, and the Government of India asked whether it would not be possible to declare the *Ficus elastica*, or rubber tree, a reserved tree on all Government lands, and whether restrictions should be placed on the sale of the raw product in the vicinity of the forests. The Bengal Government considered that the question of introducing Forest Conservancy in the valuable forests of Dacca, Chittagong and the Sunderbans must wait until the orders of the Government of India had been received on the question of additional establishments. The Government of India made the following remarks on this Report (2nd April, 1870) :

"The map which accompanies the Report shows at a glance the unequal distribution of the Government forests and woodlands over this wide extent of country. The largest breadth of Government forest is on the eastern and north-eastern frontier, where the principal difficulty appears to be to find a market for the wood, timber and other forest produce, whereas in the vicinity of the more densely populated districts the Government forest lands are few and of limited extent. This, however, makes it the more necessary to protect, and, if possible, to improve the forests of the latter class. His Excellency in Council is glad to notice in the Resolution of the Bengal Government on this Report that the proposals to take care of the Government forest lands in the Sundarbans, in the Sonthal Pergunnahs, and in the Chota Nagpur Division,

will be kept in view; he feels satisfied that His Honour will, at the right time, take action in this important matter, and he trusts that meanwhile efficient measures will be taken to guard against the alienation of any of these forest lands, or against any diminution of the Government forest rights in the same.

But although these isolated forest tracts deserve special attention on account of their position, it is of course important that the care of the vast forest lands in Assam, Cachar and Chittagong should not in any way be neglected. And here, again, the first care of Government should be to guard against the alienation of any Government forest lands likely to be valuable hereafter."

The last Report for the period under review was submitted by Leeds, and is of interest owing to the considerable information it contains on the subject of the Assam Forests. The general inspection of these forests was begun in 1868-9 and confined to the north side of the Brahmaputra River between the Monas River and Dibrugarh. This work was continued during 1869-70 in Lakhimpur and the districts of Sibsagor, Nowgong, Naga Hills and Khasi and Jaintia Hills on the south side of the Brahmaputra. Mann carried out this work.

The boundaries of the reserves in Sikkim and Bhutan had been fixed, and most of them demarcated with strong sâl posts where natural boundaries or boundary-marks of private owners did not exist. It was hoped to complete the work in Bhutan the following year, when the demarcation in Assam was to be commenced. The work of regular valuation surveys of all the reserves was to be commenced on the lines which had already been started in other provinces, the estimates and calculations hitherto made in Northern Bengal being considered unreliable. The work of dividing up the forests into blocks by means of cut lines was also to be commenced. This work would concentrate operations and lead to better financial results than had yet been attained. The working of the sâl forests on the Rajmūt (Rungeet?) had been abandoned owing to the malarious nature of the Tista Valley in the rains and the difficulties of floating timber down the Tista River.

Plantation work was being promoted with considerable success both in the hills and plains, though the Conservator comments on the disadvantages of "transplanting in this country" owing to the absence of skilled labour. Success

was being met with in the teak plantation at Bamunpokri in Assam at the foot of the hills. In June, 1870, plants not yet two years old were 5 feet to $7\frac{1}{2}$ feet high and strong and vigorous. The seed sown in 1869-70 had germinated profusely. The Conservator proposed to continue this plantation by the "toungya" method he had made use of in Burma. "The Chittagong District," he said, "will probably hereafter supply large quantities of teak. Its splendid water carriage from all parts of the district renders the floating of the timber to the port safe and easy, and there it can be shipped at little cost." Unfortunately these hopes were not to be justified. The plantations subsequently formed at Kaptai on the Karnafuli River showed a marvellous development. But they were blown down completely in the cyclone of October, 1897, and the writer had the disagreeable duty of disposing of the very poor quality soft-wooded timber (under 30 years in age) the extraordinary rapid growth had produced. Better fortune appears to have attended subsequent work of this kind.

The Conservator commented on the weakness of his staff and stated that it was owing to this that progress was not more rapid in the Province, only two Assistant Conservators being available and none of the recently appointed trained men from home having been sent to Bengal. On 1st January, 1870, four additional Assistant Conservators were sanctioned to the Province, with necessary office staffs; one for each of the six divisions. With this increase the Lieutenant-Governor wrote: "Now the vast forest tracts in the Lower Provinces have been placed under an increased establishment of management, it is hoped that a proper system of inspection and conservation will be maintained."

The financial results for the year were: Receipts Rs.1,13,753, charges Rs.95,874, surplus Rs.17,879. Of this sum the larger part was collected from the forests still under the Civil Officers, as the extra staff of Assistants had not been appointed during the year.

ASSAM

The following is the first complete published note on the Forests of Assam, given in the Resolution of the Government of Bengal on the 1869-70 Report, dated 12th December, 1870:

"The estimated area of valuable forest-covered land in Assam, so far as it can at present be ascertained, is 4000 square miles. The value of these forests, however, varies considerably;

from those on the Naga Hills, many of which are under reserve and are rich in timber, to those in the Nowgong District, which are not only inferior in quality, but have suffered much from 'jhuming,' and excessive denudation.

Luckimpore.—The Government forests in this district are divided into two groups. First, those upon lands within the jurisdiction of the civil authorities, in which conservancy arrangements have been introduced. Second, those beyond the police outposts, and in which, though within the boundaries of British territory, for political or other reasons, it is desirable for the present to abstain from interference. In both localities the timber forests, though not of inferior quality, are of vast extent, and large facilities exist for working the forests from the excellence of the water communications which prevail.

Of the first group of forests, viz., those described as 'within the moozahs,' the following are the principal :

The forests on the left bank of the Brahmaputra, between Saikwa ghât and Debroomook. The timber, though reported to be of inferior quality, had been very extensively worked. The facilities of water communication with Debrookhur, and the large demands of that station, have combined to effect the deterioration of these forests, and the closer attention of the Department is necessary for the introduction of a careful conservancy.

The forests on the Debroo Nuddee (river). These forests have also been much worked, and especially for the supply of timber for the Upper Assam Tea Company's saw mills. In many places the timber is of superior quality.

The forests on the left bank of the Brahmaputra between the Debroomook and the Bara Dehingmook, extending over an area of about fifteen miles in length and two miles in width. The timber is very valuable, but has only been worked in the immediate neighbourhood of the rivers Larooajhan and Gaboorjhan in places accessible to the villagers for their own use.

The forests on the Lower Deehing River from Dehingmook up to Jeyur, covering an area of about 560 square miles. The Deehing Saw Mill Company's operations have reached to these forests, which contain a large supply of the most excellent timber in Upper Assam, capable with care of very large extension, and possessing great facilities of transport by water.

The forests on the Upper Deehing River and its tributaries from Tezpore to the junction of the Deehing and Teerap

Nuddee, extending over an area of 120 square miles. The best portions of these forests have remained untouched from the difficulties of removing the timber, though it is noted from the Assistant Conservator's Report that here, as on the Lower Deehing, the Deehing Saw Mill Company have been extensively employed without restriction or supervision.

The forests on the right bank of the Dehsang Nuddee, covering an area of about 30 miles in length and 4 miles in width. In the absence of any special demand in the neighbourhood, this tract has been less worked.

All these forests contain most of the kinds of wood prevalent in Assam, and in places are exceptionally rich in valuable timber. The Report of the Assistant Conservator gives a full account of the different varieties to be found in the different forests, the natural facilities for the transport of the produce, and the necessity which exists for more careful protection with a view to the development of these extensive sources of revenue to the State. But the Lieutenant-Governor cannot fail to notice that the operations of the Department have brought to light the unrestricted occupation by different private companies of tracts of forest-covered land for the supply of timber for their own uses. Thus, the Upper Assam Tea Company's saw mill is in active employment in the neighbourhood of Deebrooghur; the Deehing Saw Mill Company is working the 'exceptionally fine "poma" (*Cedrela Toona*) forests on the Sessa Nuddee,' and other forest tracts on the Upper and Lower Deehing; and, according to the Assistant Conservator, 'up to the present year no restrictions have been exercised' by the Department as regards their proceedings. It appears to the Lieutenant-Governor that these statements demand the attention of the Conservator. In May last, the Government, on the recommendation of the Conservator, sanctioned an arrangement between the Forest Department and the North-East Saw Mills Company for cutting timber within certain limits in the Assam Forests. Rules were framed to prevent unreasonable felling to the deterioration of the forests; higher charges were laid down for the use of the more valuable trees, and the arrangement was adopted that no timber should be used by the company until marked and passed by the Forest Department. Similar regulations are required for the prevention of unnecessary waste of the Government forests in other places where such companies are established; for, while the Lieutenant-Governor fully recognises the value of such

FOREST OPERATIONS IN BENGAL AND ASSAM 429

agencies for the supply of timber to meet all local wants in Assam, it cannot be permitted that the system hitherto in force of uncontrolled use of the State forests by private companies should continue."

Wholesale lumbering had, in fact, quickly followed the advent of the tea planter in Assam, and the Forest Department was but just in time to save great areas of fine timber from the lumberer.

"In the forests beyond the 'mouzahs,' no conservancy arrangements have yet been enforced, nor indeed has inspection even been effected; but general information points to the probability of their containing the same kinds of timber as the forests which have been explored, and possessing easy means of transport for their produce in the numerous water channels communicating with the Brahmaputra. It has been suggested, as a preliminary to the introduction of regular conservancy, that these forests might be advantageously worked to a profit by holders of permits from the Forest Department. The subject is one which the Conservator may take into consideration; but the Lieutenant-Governor desires that there may be no interference with the people occupying tracts beyond the direct control of the civil authorities, unless with the previous consent of the Commissioner of the division.

It is noted that some forests of great value are found in Luckimpore, on the south side of the Brahmaputra. Care and attention are undoubtedly necessary to promote the growth of these trees, for their importance in rearing silk-worms cannot be exaggerated as long as the manufacture of silk continues to be one of the most profitable occupations of the inhabitants of the district.

The Lieutenant-Governor would wish for some explanation of the Assistant Conservator's statement in page 22 of the Report, that 'a large revenue is still realised from the "caoutchouc mehals" in Luckimpore, but the greater portion of the caoutchouc on which the revenue is realised is imported from foreign territory.'

Seeksagur.—The forests are reported to be very much scattered, but withal of a superior description, though not so generally rich as those of the Luckimpore District; the more important tracts being those on the Deehing Nuddee, between the Deehingmook and Jhangeemook, that portion of the

Nambur Forests on the left bank of the Dhunsiri River, and those on the left bank of the Kullanee River. Considerable portions of these, as well as of other tracts of valuable forests scattered through the district, are said to have been taken up for tea cultivation.

It is reported that many of the forests near the Assam Company's gardens are so far exhausted that plantations are being formed for the purpose of obtaining wood for charcoal, and the Assistant Conservator has suggested the introduction of conservancy measures into such portions as have not been taken up for tea cultivation, or such as have again been thrown up, or may be abandoned in future. The Lieutenant-Governor hopes that the Conservator will give his best attention to this suggestion.

Naga Hills.—These forests cover 1288 square miles, and are some of the most valuable in Assam, being compact ever-green forests with a very large proportion of valuable timber trees in them. They are enumerated as the Doyang, Dhunsiri and Kullanee; the second being reserved and placed in charge of a forest watcher for protective purposes. It is observed that large portions of the Kullanee Forests are destroyed by 'Jhum' cultivation. Measures should be attempted to exclude such cultivation from the midst of valuable timber forests, in which the introduction of a system of Forest Conservancy is desirable. The attention of the Commissioner will be called to the subject.

Nowgong.—Here it appears that the predominating forests are of sâl, but are of little importance and contain very stunted trees and saplings only. Those marginally cited have undergone inspection, but, from the inferiority of the timber and the difficulty of access to the forests, no conservancy measures are contemplated.

Khasi and Jynteah Hills.—It is reported that most of the forests on the southern slopes of these Jynteah Hills have been leased by Government from certain chiefs, and that the privilege of felling timber in the Jeerang Forest was sold by Government for three years, from April, 1868, to April, 1871, on the fixed annual rent of Rs.150, to Chandi Rai Seim of Nunklow, and that the revenue derived from the Mandum Forest is entirely devoted to the maintenance of the Seim's family. It does not appear that there has been any correspondence on the subject between Government and the local officers, by whom, in connection with the Forest Department, it is presumed the

settlement of these matters has been concluded. The Lieutenant-Governor desires to be supplied with a copy of any correspondence that may have taken place showing the precise conditions on which the sale of the forests in question was effected. The absence of all restriction in the cutting of timber in the Jeerang Forest, even for the limited period of three years, seems an undesirable arrangement.

Extensive forests of the *Pinus longifolia* (*Pinus khasya*) are to be found adjacent to Shillong; but the Lieutenant-Governor regrets to learn of their indifferent treatment by those who own them. Government is unable to interfere in the management of these private forests, but the Commissioner's attention will be called to the remarks regarding the condition of the forests within the station.

The suggestion that the extension of the tracts of pine forests in which the trees have suffered from jungle fires might be secured by scattering seed, is perhaps deserving of experiment."

About seven square miles of land round Shillong belonged to the Government and contained some good quality pine forests on it. In spite of the above recorded remarks of the Lieutenant-Governor the treatment of the forests on all Government land during the succeeding 30 years left much to be desired.

CHAPTER XII

FOREST OPERATIONS IN BENGAL AND ASSAM, 1865-1870 (continued)

THE FORESTS OF THE CHITTAGONG DISTRICT, CHITTAGONG HILL TRACTS AND LUSHAI

IN the information collected under Anderson's Circular dated 19th October, 1864, issued through the Secretary to the Government of Bengal, to all Commissioners of Divisions, no mention was made or data given of the extensive forests of Chittagong and the Hill Tracts, Hill Tipperah and the Lushai Hills. It will be of interest, so far as possible, to rectify this omission from other sources.

In his book, *Thirteen Years Amongst the Wild Beasts of India*, Sanderson gives some interesting information on the subject of the forest areas of the Chittagong District, the Chittagong Hill Tracts and the Lushai Hills to the north as they were at this period and had been for a century past.

Sanderson was in charge of the Elephant-catching, or Kheddah, Department in Mysore for some years. In 1875 he was deputed to Dacca, which was the head-quarters of the Bengal "khedah" establishment, to officiate in charge during the absence on furlough of the permanent officer. The East changes but slowly, and his description of the journey to Dacca, via Goalundo up the Brahmaputra, might have been written a quarter of a century after, or before, his visit. Dacca, situated on the Brahmaputra, had been a city of great importance under the Moguls, but although still populous (70,000 inhabitants) its former glory had departed. It had once been a great shipbuilding centre, drawing its supplies of wood from the great forests on the Chittagong Hill Tracts, Hill Tipperah, and Lushai Hills and areas to the north. In old times a fleet of 800 armed vessels had been maintained at Dacca, and were employed in guarding the southern coast against the ravages of Aracanese pirates.

CHITTAGONG FORESTS AND THE HILL TRACTS 433

Most of the elephants required for the service of the Bengal Government for military and other purposes were provided by the Dacca "khedah" establishment. Records were extant detailing the work of this establishment since 1836, but the British had carried on operations long before this date; and the "kheddah" department had probably been in existence under the Native Governments, who preceded our rule, for a very long period.

Having held charge of the forests of the Chittagong District and Hill Tracts about a quarter of a century later than Sanderson's visit the author is of opinion that Sanderson's brief description of the condition of the forests as they were at the period is worthy of record here.

Chittagong is a district situated in the north-east corner of the Bay of Bengal, having Aracan, the western district of Burma, on its eastern border. It is divided into the Chittagong District proper (the coastal area) of about 2700 square miles, which was, and had been long ere Sanderson's visit, well cultivated and densely populated. The forests on the low hills consisted chiefly of bamboos and stunted trees, all large timber having been cut out many years before. Interspersed with this bamboo jungle were areas of a tall stout grass called "sunn," the areas on which it grew being termed "sunn-kholas." These forests were of considerable value, since the houses of the population were chiefly constructed of bamboos and thatched with the grass. Considerable stretches of forest had also been cleared by planters on the level ground and in the low hills of the Chittagong District for the growth of tea, several of these gardens being in a flourishing condition at the time of Sanderson's visit. But as was usual at the period the planters recklessly devastated the forests in their vicinity to supply their requirements, with the result that the fuel question, as also the supply of bamboos, so largely used in house construction and so forth, gave considerable trouble later on.

The Hill Tracts area, comprising roughly 6800 square miles, was densely clothed with forest. It consists of a series of parallel, broken-up ridges running generally in a north and south direction to the sea-board, inhabited by a few jungle tribes who practised the method of shifting cultivation (known as *jhuming* in Bengal), and at the period the region was almost unknown to the European. Rangamatti was the frontier police outpost, situated a short distance within the

southern boundary of the Hill Tracts on the Karnafuli River. Beyond lay an unknown wild region

From this great forest area, which extended beyond the Hill Tracts into the Lushai Hills, the latter also covered with dense forest, large supplies of logs for boatbuilding and other purposes, large canoes, formed by burning out the interior of the stems of large-sized trees, bamboos, canes and so forth were floated down the Karnafuli River and its tributaries to supply the Chittagong and other markets. The Karnafuli River formed the great highway down to Chittagong and the Bay of Bengal; and other rivers to the east, the Moiskal, Baghkhalli and the Kolandyne in Aracan, which joined the Bay of Bengal at the port of Akyab, all having the same general north and south direction, were equally utilised in the transport of material from the forests in the north and formed the arteries of communication of the region. Roads, other than elephant tracks and footpaths, were non-existent.

It is difficult to say how long this timber trade had lasted at the period here dealt with. Enormous amounts of valuable timber must have been cut out, and it is probable that even at this time all fine timber on the banks of the rivers in the lower parts of their courses had been cleared. No supervision was exercised over the fellings, the timber merchants of Chittagong never proceeding further up the river than Rangamatti and usually only to Chandraghona, below the boundary of the Hill Tracts. There they took over the timber, etc., brought down, and made advances for fresh consignments to the hill-men who actually did the felling and rafting work. "Jhuming," as has been remarked, was the method of livelihood of the hill tribes, and areas of fine forests were destroyed by this method of cultivation; the areas so treated becoming covered with dense masses of the small *Muli* bamboo (*Melocanna bambusoides*), or with coarse grass, plantains, and inferior species of trees.

The operations of the Kheddah Department, continued over such a long period of years in the southern parts of the Hill Tracts and Hill Tipperah, with the felling work carried out on a large scale to form the stockades and the burning of the forest which was resorted to when considered necessary to the operations, had also resulted in a great waste and deterioration of fine timber forest, the areas in which the Department carried out its operations being easily distinguishable for years afterwards.



VIEW OF THE CHITTAGONG HILL TRACTS AND THE KARNAPULI RIVER FROM RANGAMATI

Sanderson undertook his elephant-catching operations on the Chengree and Myanee Rivers, tributaries flowing from the north-west and joining the Karnafuli, the former at Rangamatti and the latter at Kassalong above the frontier outpost. The officer in charge of the "kheddah" had never gone above Rangamatti, leaving the actual work of entrapping the elephants to his native jemadars in charge of the parties of hunters. Sanderson took charge of the whole operations in person and was thus probably the first European to visit the forest region on these rivers. He crossed into the Hill Tracts from Rajamaka-Bheeta in the north-east of the Chittagong Collectorate (which he terms the coast district). The latter village was in the highly cultivated open country, which was comparatively level save for low hills. He provisioned his expedition by means of a fleet of dugouts, one of the convoys proceeding up the Chengree from Rangamatti, the other up the Myanee; whilst Sanderson with the elephants and his party marched across the hills. The usual method of travelling for Europeans and natives alike in this region was in dugout canoes, the larger ones being planked up on the sides and having semi-circular mat roofs. The crew consisted of a steersman and two rowers. These boats were sailed before the wind, but otherwise rowed, poled or towed from the bank. In the Karnafuli the tide ran up to a short way beyond Rangamatti, which was 80 miles distant from Chittagong. Smaller dugout canoes had to be used in the tributary rivers higher up.

"Rajamaka-Bheeta was a small village," says Sanderson, "on the border of the immense forest which extends without a break from Chittagong for hundreds of miles north and east through Tipperah, the Chittagong Hill Tracts and the Lushai country, and south through Arracan and Burma. On the 29th December I stood on the edge of the jungle at Rajamaka-Bheeta, whilst the men entered in single file, each salaaming and crying 'Allah! Allah!' by way of invoking luck. The matchlock men led the van, firing *feux de joie* with a few rounds I had given them from the magazine to celebrate the commencement of our enterprise." To the plainsmen of India the great forests were regarded as a terrible place, the abode of devils and monsters, a region to be avoided at all costs. Even the "kheddah" men who, says Sanderson, "were rascals of various degrees," and assuredly he would have obtained no other class of man to enter the jungles to undertake so dangerous and irregular an employment, faced the great

Forests with fear and trepidation. That this fear and dread of entering the forest regions has passed away to some extent is true. But it has by no means wholly passed from the better classes of Indians, from whom it will be absolutely essential that the Staff should be recruited under the new system of administering India recently inaugurated if the administration of the forests is to be carried on with the efficiency it has now reached and if it is to make the continued progress that is confidently expected.

From Rajamaka-Bheeta to the range of blue hills, the Bhangamoor Range, to be seen in the distance, 50 miles away in a north-easterly direction, the hilly country was mainly covered with grass 10 feet high, or bamboos and wild plantain with some patches of open tree forest. "This was country which had been cleared and cultivated at intervals from time immemorial, relapsing for a few years into waste." The few villagers he passed Sanderson describes as those of Hill Aracanese and Chuckmas with strongly marked Indo-Burmese faces, the houses all raised upon bamboo platforms about 10 feet from the ground, a good protection against malaria and dampness. On the top of the Bhangamoor Range, when he eventually reached there after three days' difficult march through a pathless country of hills, Sanderson says: "The view from the top of this hill was uninteresting. Before us were higher hills" (the Kalamoin Range, on the other side of which was the Myanee Valley) "covered with nothing but long grass with a few bamboos in the hollows; behind us all the fine trees had been *jhumed* off the country."

At the bottom of the northern face of the Bhangamoor lay the Chengree Valley and stream. Here Sanderson found fine heavy timber forest clear of undergrowth. This was the type of forest which he required for his operations, since wild elephants would not be found in open grass country.

The point at which Sanderson struck the Chengree was, he estimated, about 100 miles above Rangamatti and perhaps 60 miles from its source. The river here was only 15 yards wide and 2 feet deep. He noticed that it was very muddy for a hill stream, this being the usual condition of the streams in these hills, as they flow through alluvial soil void of rock. The Myanee River to the east, whose valley is situated between the Kalamoin and Dalamoin Ranges, is somewhat larger than the Chengree. Sanderson thus describes the forest on the Chengree:

CHITTAGONG FORESTS AND THE HILL TRACTS 437

"The forest was very fine along the Chengree, being open forest of huge timber and giant creepers, with here and there patches of canes, the beautifully glossy, dark green serrated leaves of which, several feet in length, like giant ferns, shone in the morning sunlight. Nothing can be imagined more graceful or beautiful than a cane-bush (the ordinary cane of commerce). It often grows in extensive plots, but frequently in single plants, as a creeper running up trees and crowning them with graceful plumes. The cane requires a moist, rich soil. There are several varieties : one makes the best walking-canes, another is used for basket-work, a third for the rattan of chair bottoms, etc. Several of the men of our party were adepts at cane work, and they made me many nice and useful articles of camp furniture. Of all prickly things in creation the cane is perhaps the foremost, very different in its natural state from the smooth, but still pungent, implement of our schooldays' recollection. It grows of all lengths, often above 200 feet, and both stem, leaves and tendrils are covered with horrible thorns. Its fruit hangs in clusters of about fifty berries, each being the size of a cherry and of a bright cream colour, with a singular appearance of being carved out of wood. They are edible. The cane itself contains a large quantity of water throughout its length. I cut 22 feet off one of about three-quarters of an inch in diameter, and by simply blowing through it obtained half a tumblerful. The roots and sprouts when just above ground make a good vegetable. To prepare the cane for commerce, the rough peel studded with thorns is merely stripped off, and the cane is ready for use."

Sanderson did not possess the botanical knowledge to be able to indicate the different species of fine timber trees he was making a first acquaintance with in this region. But the giant timber trees he alludes to were species of *Dipterocarpus*, *Swintonia*, *Tetrameles* and *Chickrassia*, with other valuable timber trees, such as *Lagerströmia Flos-Reginæ*, *Dichopsis*, *Gmelina*, *Mesua*, *Cedrela*, etc. In addition to the grass and wild plantains which he notices as so plentiful in the "jhumed" areas, he must have found in the Chengree and Myanee Forests an undergrowth of palms such as *Livistona* and *Licuala*. In fact, all the characters of a tropical forest. For the Chittagong Forests, with those of Tenasserim, are the most really tropical of the forests of the Indian Empire.

Having received news of a herd of elephants having been

surrounded by one of his parties higher up the Chengree, Sanderson marched up to the spot. "The forest for the most part of the way—our path skirted the Chengree—was fine open forest that had never been cut, except near a large *jhuma* settlement called Gasban, which we passed at 12 o'clock (after five hours' marching). The trees were so tall, and the shade so high and close, that nothing more than a skull-cap was necessary, the sun being unable to penetrate the dark forest."

There were very few inhabitants in this part of the hills at that period, Gasban being the only settlement for many miles round. The people in the plains, says Sanderson, called all the hill people "*jhumas*," from their practice of shifting cultivation. The people were of several tribes, consisting at that time, he was told, of settlers from Aracan, Chuckmas, Mugs, Tipperahs, and to the east the dreaded Kookies or Lushais. Of these tribes the Chuckmas, he thought, appeared to have more claims to be called aboriginal to the Chittagong Hills than the others, though the Kookies were aboriginal in the eastern portion. "The one thing," says Sanderson, "about which there seemed no doubt at all was that the Kookies terrified the rest out of their seven senses, or had done so till recently, by occasional raids to the westward, where they are represented to have put to the sword everybody but such women as they carried off into captivity. It resulted from this that large tracts had been abandoned from time to time by the '*jhumas*,' when the Kookies, who seem to be a fine warlike race, were hard upon them. Within the last few years, however, the establishment of Rangamatti and Demagiri as frontier police posts, constituting a guard between the troublesome Kookies and the tribes to the west, has given confidence to the latter, and the Hill Tracts will probably be better populated soon." Sanderson's prophecy proved correct. But the writer found a quarter of a century later that the increased population had resulted in the more rapid devastation of the fine forests owing to the "*jhuming*" operations carried out; and he had occasion to strongly represent this aspect of the position to the Commissioner, and accompanied the latter on a visit to the Hill Tracts in order to validate his contention. Sanderson continues:

"A European political officer and a police officer live at Rangamatti and another police officer at Demagiri, and these maintain amicable relations with the Kookies. It is the Kookies' annual custom, I was informed, to have extensive

raids of two, three, or four thousand men forming a single party. This raiding is done in the cold weather. As they are an independent tribe they are merely requested to confine their pastimes within their own limits, and not to trespass on British territory as formerly. Infraction of this rule caused the Lushai Campaign of 1870-1. Gasban, the village I had passed through on the Chengree, had been cut up by the Kookies about 1852, but, being well within protected limits, was now flourishing again. At Jadoogapara (about 20 miles above where Sanderson struck the Chengree) "it is said, once on a time, stood a large 'jhuma' settlement, till one fine morning a sudden yell on all sides at daybreak announced the Kookies, and no one escaped to tell the tale. I could not see a trace of the village; but the structures of the hill people are not of a very permanent order."

So much for the Kookies at this period. The subsequent history of this corner of India will show that other severe lessons had to be dealt out to them before they realised what the *Pax Britannica* really meant.

The "kheddah" into which the surrounded elephants were to be driven was situated two miles from Jadoogapara, and Sanderson thus describes it: "The 'kheddah,' or stockade, was constructed of a circle of stout uprights 12 feet high, consisting of the toughest poles and young trees of the best timber trees placed so close together that the hand could scarcely be introduced between them, and well backed with forked uprights and cross-beams, the whole being lashed together with strips of cane. The guiding wings were of similar construction . . .; the whole was concealed in thick forest on an elephant run, and the new woodwork was screened with cane leaves." Thirty-seven elephants were trapped in this stockade, and therefore the number of fine trees which were sacrificed to construct it can be estimated. Three other similar stockades were constructed during this trip. As late as 1900 the Kheddah Department visited the Hill Tracts whilst the writer held charge of the Forest Division, and similar destructive methods of trapping elephants were still in force. This was, it is believed, their last visit to the region, their operations being subsequently transferred to Burma till the Department, for which there was no longer any use and which threatened to exterminate the Indian elephant, was finally disbanded. It was a barbarous institution, for the

mortality amongst the captured elephants was very high, Sanderson puts it at 20 per cent, during the first year after capture. And this omits those killed or injured and destroyed during the trapping operations. For the purpose of old-time warfare and military transport, methods which we had copied from the natives of the country, the elephant was undoubtedly of high utility, whilst the animal when in numbers was a great pest to the agriculturist. These facts perhaps justified its capture in the olden days. But the practice was carried on into a period when such justification had disappeared. The Indian elephant was rapidly diminishing in numbers, considerable areas of valuable young growth in the forests were destroyed in the "kheddah" operations, and gross abuses arose in the Department which carried out these operations. The elephant is a most useful animal to the Forest Department, and officers of the Department now undertake its capture when required, a far more satisfactory as it is a cheaper method of obtaining the animals necessary.

Sanderson then marched to the top of an outlier of the Kalmoin Range, through bamboos and tree forest, and camped at a small village on the summit. The forest down the opposite slope was open bamboo and large timber. A stream flowing through a deep chasm which cleft the main range, here covered with big timber forest, was followed till it debouched into the Myanee Valley, and the river of that name at a place called Bhowalkali, about 130 miles from Rangamatti. The forest on the Myanee Sanderson describes as consisting of fine tall timber trees, and from the hills he climbed nothing could be seen but fine forest clothing the hills and stretching away in all directions. And this aspect of the countryside continued for many of his marches down the Myanee River to Rangamatti. For on completing his operations at Bhowalkali he returned to Rangamatti, via the Myanee River, with some 130 elephants all told, including the tame ones used in capturing the wild ones, the elephants using the shallow stream as a road for a considerable part of the distance till it became too deep for the purpose.

Sanderson's account of the forests of this region, if scanty, is of some value, since it forms the only record to the writer's knowledge extant at the period here dealt with. It gives us an eye picture of a great wild forest-covered mass of hills of large extent and small population, in which up to that time the felling operations and "jhuming" operations of the people

CHITTAGONG FORESTS AND THE HILL TRACTS 441

had made, so far as was then known, but small impression except in the southern borders of the Hill Tracts and in the neighbourhood of the banks of the lower parts of the rivers.

One of the points which struck Sanderson, with his Mysore experience, was the fact that the forest people of this region built their houses on stagings clear of the ground. In this connection he wrote : " I believe the one fact of the dwellings of jungle-people in Southern India—at least the Kurrabas and Sholagas in Mysore—being built on the ground, is sufficient to account for their miserable condition. The miasma which causes jungle fevers is said to be heavy and to hang close above the surface, for which reason it is unsafe to sleep on, or close to, the ground in malarious localities. The Kurrabas and Sholagas do not understand this ; and their children, from their short stature, live more in the unhealthy stratum of air than adults. This may partly account for the greater proportion of sickness among them."

The discovery of the connection between the mosquito and malaria had not yet been made.

" In the Garrow and Chittagong Hills in the north-east and east of Bengal the jungle tribes live in large and well-constructed houses raised 8 or 10 feet from the ground on bamboo supports. In front of each is a verandah for the children to play on, and in which their parents sit when idle ; the whole is reached by a ladder and is of such simple construction that any jungle man can build himself a house in two or three days, with no other tool but his axe. Thus the people sleep well above the reach of malaria, and are kept dry and comfortable in all weathers instead of grovelling on the damp ground, as do the Kurrabas and Sholagas."

A quarter of a century later the author had occasion to visit a village high up above the Barkal Falls on the Karnafuli River, some 40 miles or so to the east of Sanderson's camp on the Myanee River. It had become necessary to explain to the village headman the precise nature of the Forest Department rules in force on the subject of felling and drift timber, both of which were being far from closely adhered to. In a note in his diary made at the time the writer of this history finds the following entry :

" Karnafuli River, 30 miles above Barkal Falls : A queer nomadic population this. A bit of a ' jhum ' on the river bank, a bamboo hut built on piles with a front verandah,

usually filled with babies, and a dugout or two appear to satisfy their wants in life. And the whole lot, with the exception of the babies, can be obtained free from the forest."

The quarter of a century in this region had brought about but little change !

In concluding this part of the History of the Forests, which concerns primarily the work of exploring the forests and, to some extent, their demarcation, full credit should be accorded to the men engaged upon this duty. The work was extremely arduous, carried out under conditions of hardship it would be difficult to portray to the uninitiated, but which many Forest Officers with most of their service behind them will readily appreciate. To the modern Forest Officer in most parts of India the old conditions of life and forest work will be but a name only. During the period dealt with in this part small tents or rough village huts or hastily erected bamboo or grass sheds formed the home of the Forest Officer for the greater part of the year. European stores were not procurable without great trouble and expense. The Forest Officer depended upon his gun and rifle. Little attention was paid to seasons of the year, the work being carried on equally during the torrid heat of the hot weather or during the drenching rains of the monsoon when the forests were full of malaria. In many parts of India the forests are closed down during the latter period nowadays and the forest staff are located out in the plains.

Such being the conditions under which the first members of newly constituted Forest Service worked, we should readily accord them all honour for the wonderfully efficient manner in which they brought forest organisation into being and made possible the great development which the next three decades were to witness. It would be invidious to mention here any names of these great Pioneers. They have already been alluded to in the pages of this and previous parts.

PART II

THE PROGRESS OF FOREST CONSERVANCY AND
THE DEVELOPMENT OF THE FOREST
DEPARTMENT IN INDIA, 1871-1900

CHAPTER XIII

A BRIEF REVIEW OF HISTORICAL FACTORS AND ADMINISTRATIVE ACTS AFFECTING THE PROGRESS OF FOREST CONSERVANCY, 1871-1900.

BEFORE considering the progress made in the conservation of the forests in the different provinces of India during the last three decades of the nineteenth century it will be necessary to glance at certain occurrences and administrative measures which were given effect to during the period now to be reviewed ; for both were not without their influence on the development of the administration of the forests and the progress of a forest policy for the country as a whole.

It has been already mentioned that Lord Mayo was appointed Governor-General in January, 1869. During his short tenure of office he set himself the task of adjusting the finances of India so that the expenditure in normal years should be within the income. The attempt itself is one well worth remembering to the credit of this gifted but ill-fated Viceroy. For long years Indian finance had remained in a state of chaos due, firstly, to the heavy military expenditure entailed throughout a period of almost one hundred years, and, secondly, to the inefficient method of accounting of the East India Company. By imposing extra additional taxes and enforcing rigid economy Lord Mayo succeeded in his purpose. He reorganised the Public Works Department and paid the closest attention to the working of every Department in order to secure efficiency without waste. He also introduced the system of State Railways, and this to some extent had an important bearing on the work of the Forest Department during the early part of the period here dealt with.

Lord Mayo's method of financial reform was based on decentralisation. He introduced a measure of decentralisation which made every Provincial Government responsible for its

own finances within certain defined limits. Previously, the Local Governments had engaged in a scramble for grants from the Supreme Government. The Provincial Administrations had had therefore no interest in economy, whilst the Government of India was unable to make accurate estimates of revenue and expenditure or to exercise effective control over Imperial finance. Although the mere introduction of the new scheme did not at once bring order into Indian financial administration it was practically the foundation-stone upon which the subsequent success was ultimately built up. Had Lord Mayo been spared to India for the normal eight years which Governor-Generals spent in the country at this period he would have achieved much. After three short years' work he was struck down by a convict during a visit of inspection to the convict settlement at the Andaman Islands, and a life and work of great promise was there brought to a tragic close.

Lord Northbrook, who succeeded Lord Mayo, was a man of a different type. His tenure of the post of Governor-General was uneventful so far as internal administration was concerned. His foreign policy was not so successful, as he reverted to Sir John Lawrence's Afghan policy with the result that the Amir turned to Russia for support. The Ministry at home was not in agreement with Lord Northbrook on this question, and his retirement in 1876 was due to his disinclination to carry out their wishes. There was a second reason of a more domestic character having reference to the taxing of Manchester cotton goods—a problem which was destined to crop up for many years to come.

Lord Northbrook's Governor-Generalship in its closing year was made memorable by the visit of the Prince of Wales, later King Edward VII, in the cold weather of 1875-6. This visit was historical if only for the reason that it was the first occasion that the heir to the British throne had visited India.

The Prince landed in Madras, and after visiting various places in that Presidency proceeded to Calcutta by sea and then travelled up country. It is of interest to note that he spent some days with the Commissioner of Kumaun and Gurhwal, Colonel Ramsay, shooting in the great Terai jungles and paying a flying visit to Naini Tal.

Lord Lytton succeeded Lord Northbrook in 1876. The first and perhaps the most memorable incident of his Viceroyalty was the passing of the Royal Titles Act (January 1st, 1877).

under which Queen Victoria was proclaimed Queen-Empress. The tour of the Prince of Wales had emphasised the necessity of giving official recognition to the fact that Queen Victoria had, since 1858, become the paramount sovereign of all India, including the Native or Protected States. Lord Northbrook's Government recommended that Her Majesty should be designated as Sovereign. Disraeli, who was Prime Minister at the time, supported the idea, and in spite of considerable opposition obtained the passage of the Bill through Parliament. The duty of giving effect to the Act devolved upon Lord Lytton. It has been said that Lord Lytton "regarded the enactment as the beginning of 'a new policy by virtue of which the Crown of England should henceforth be identified with the hopes, the aspirations, the sympathies and interests of a powerful native aristocracy.' He believed strongly in the appeal to the loyal sentiment of the princes and nobles, and he was right. The form of title chosen, 'Kaisar-i-Hind,' 'the Cæsar of India,' on the analogy of Kaisar-i-Runn, the well-known designation of the Byzantine Emperors, was generally approved as being the best that could be devised."

How true was Lytton's faith in the loyalty of the Indian princes and nobles has been shown perhaps to a greater extent than ever before during the recent Great War.

The proclamation of Her Majesty the Queen's assumption of the new dignity was made with great solemnity at an Imperial Assemblage, or Durbar, held at Delhi on January 1st, 1877. The "Most Eminent Order of the Indian Empire" was founded at this time.

The rejoicings of this epoch-making event were marred, however, by the development of a very severe famine which lasted during the years 1876-8. This famine and others of the period will be dealt with later on. It may be mentioned, however, that Lord Lytton was almost the first to enunciate sound and well thought-out views on a famine policy; for it was upon his foundation that the system of famine administration was subsequently built up. The Viceroy's views upon financial questions were sound. He gave much attention to the complicated question of the Cotton Duties and was desirous of dispensing altogether with Sea Customs revenue. He extended the decentralisation schemes initiated by Lord Mayo and carried out an even more important and startling measure—no less than remedying to a large extent the inequalities of the salt tax and in abolishing the barbarous salt customs hedge.

This hedge and its purpose is described as follows by Sir John Strachey, the Finance Minister :

"A customs line is maintained extending from a point north of Attock to near the Berar frontier, a distance of more than 1500 miles. Similar lines some hundreds of miles in length are established in the Bombay Presidency to prevent untaxed salt from Native States entering British territory. Along the greater part of this enormous system of inland customs lines, which if they were put down in Europe would stretch from London to Constantinople, a physical barrier has been created comparable to nothing that I can think of except the Great Wall of China. It consists chiefly of an impenetrable hedge of thorny trees and bushes, supplemented by stone walls and ditches, across which no human being or beast of burden or vehicle can pass without being subjected to detention and search. It is guarded by an army of some 8000 men (another authority says 13,000 officers and men), the mass of whom receive as wages Rs.6 or Rs.7 a month. The bare statement of these facts is sufficient to show the magnitude of the evil. . . . I cannot find any record of the date of the construction of the hedge, which replaced innumerable inland customs posts scattered throughout the interior of the country."

The whole of this customs line was abandoned in 1879, with the exception of a portion along the Indus, maintained to prevent the still lightly taxed Kohat salt being smuggled across the river.

The political position of India during Lord Lytton's administration may be summed up in three words, "Russia and Afghanistan." Soon after becoming Viceroy the important step was taken by Lytton in 1876 of occupying Quetta in Baluchistan. The occupation was effected by amicable arrangement with the Khan of Khelat. This was one of the wisest and far-sighted measures of the time, since the strategical position thus secured dominated the road to Kandahar and gave the Government of India full control over the Bolan Pass. The Afghan flank was thus turned, and the direct routes to Kabul became matters of secondary importance. Since that date Quetta has become a very large military cantonment. The district is prosperous and a Forest Division has been formed in Baluchistan. The occupation of Quetta was only the prelude to what was to come. The whole period of Lytton's administration was overshadowed by the strained relations between

Russia and England. The events occurring in Europe resulted in the Russo-Turkish War of 1877, the Treaty of San Stefano in March, 1878, followed by the famous Congress at Berlin in June of that year. At this period England was strongly opposed to Russia obtaining possession of Constantinople, and Beaconsfield was successful in defeating Russian ambition in this respect. The successes of Russia in the Field had had, however, an unforeseen reaction in India, the Vernacular Press or a considerable proportion of it publishing seditious articles in favour of Russia, vilifying the British and even suggesting the assassination of British officials and the elimination of the British from India. The same thing has been seen rather more intensified, owing to the greater numerical strength of the Press, during and since the Great War.

Lytton and his Government came to the conclusion that to ensure public safety a law was essential to enable a curb to be placed upon undue licence on the part of that section of the Press not printed in English. A Bill was introduced and supported by the whole of the Legislative Council as well as by the Provincial Governments, with the exception of Madras, where at this period the vernacular Press was insignificant. The Bill became law in 1878. The object of the Act was not direct punishment, but rather prevention of abuse by means of security bonds to be given by offending newspaper proprietors under strictly regulated conditions. The Act was in force for four years and fully served its purpose, since it was only given effect to in one instance. It was repealed in 1882 under Lord Ripon, it being considered that the amended section (124 A) of the Indian Penal Code would prove sufficient and enable the prosecution of offenders in this respect.

The difficulties with Russia in Europe had their almost inevitable rebound in Afghanistan. It will be remembered that in 1873 Northbrook had refused to give the Amir Sher Ali assurances of protection by the British Government. This unfortunate attitude was taken up on instructions from the Gladstone Ministry. It drove the Amir into the arms of Russia, whom he believed to be by far the stronger power—a belief maintained for many years thereafter. During Lytton's administration a new policy was laid down by Beaconsfield and Lord Salisbury, who was Foreign Secretary; this policy had for its basis the determination to obtain from the Amir a declaration as to whether he was a friend or enemy of the British (a somewhat elusive hope to those who know the

Afghan); of preventing Afghanistan falling under the control of Russia; and lastly, of preventing the Amir from causing mischief to British and Indian interests. We have seen that in pursuance of this policy the brilliant step of occupying Quetta had been taken. Two years later, the Amir having received with great honour a Russian envoy and turned back at Ali Musjid Sir Neville Chamberlain, the British envoy, refusing him a passage through the Khyber Pass, the second Afghan War broke out. Simultaneous advances were made through the Khyber (Browne), Kurram Valley (Roberts) and Quetta (Biddulph). The expedition was brilliantly successful and the Amir fled into Russian territory, where he died the following year. The treaty with Yakub Khan, the new Amir, involving the occupation of the passes and the control of the foreign affairs of Afghanistan by the Government of India; and the treachery which resulted in the massacre at Kabul of the British envoy, Sir Louis Cavagnari, are well known. Kabul was eventually occupied by Roberts. The business was not over, however. The dreadful day of Maiwand (July 27th, 1880) saw the defeat of Barrows, the remnant of his brigade retreating to Kandahar. To relieve the latter place Roberts made his great march from Kabul to Kandahar, covering a distance of 318 miles of difficult country in twenty-three days. His small force consisted of 2800 Europeans, 7000 Indian soldiers and about 8000 followers. Eventually Abdur Rahman was recognised as Amir, Kandahar restored to him and the Kurram Valley was given up—Lytton's far-sighted policy of breaking up Afghanistan into separate States being disallowed. It is conceivable that great and serious difficulties in the future would have been obviated had it been given effect to. The Government of India undertook to support the Amir against foreign enemies. Thus the refusal of 1873 was accorded seven years later, after the expenditure of much blood and treasure.

In 1880 a Gladstone Ministry came in at home (pledged to reverse the policy of its predecessors) and Lytton resigned, the Marquess of Ripon being appointed Viceroy.

In the interests of this history of the forests it is necessary to deal briefly with these frontier events although space restricts a more detailed review. It will be remembered that there had been the closest connection between Afghanistan and the regions extending to the Hindu Kush and India throughout many centuries. Abul Fazl, the famous and erudite Secretary of State and historian of Akbar, made the following statement

in this connection, and it is as well worth remembering now as it ever was in the past :

"The wise of ancient times " (he was writing about the year 1595 or a little later) " considered Kabul and Kandahar as the twin gates of Hindustan, the one leading to Turkestan and the other to Persia. The custody of those highways secured India from foreign invaders, and they are likewise the appropriate portals to foreign travel."

It is at least open to doubt whether this ruling coming down the ages is not as true to-day. Certain forestry aspects are also to some extent bound up with this question, as will be shown in later parts.

In some measure Lord Ripon's viceroyalty was one of reversing the policy of his predecessor. The vernacular Press Bill was withdrawn, and the ill-fated Ilbert Bill did not pass into law owing to the opposition it aroused from the non-official European community. Of domestic interest was the first General Census (1881) of all India, except Nepal and Kashmir. The statistics collected disclosed an enormous mass of important and novel information of use to every branch of the Government Service in India.

It will be remembered that the Mysore State had been ruled by the Government of India since 1831. In 1867, during the viceroyalty of Sir John Lawrence, it had been decided by the Secretary of State and the Government of India that the State should be restored to the Maharajah when he came of age. The latter event took place in 1881, and the Maharajah was installed with full power over his State. During the half-century of direct British management the State had been admirably managed and a succession of efficient officials had arisen. This promised well for the future. The forests had been managed under the supervision and advice of the Conservator of Forests, Madras Presidency. These were now returned to the Maharajah and unfortunately for some years to come were to suffer to some extent from the change, efficient native management or knowledge of forestry science not having been acquired at this period.

Perhaps Lord Ripon's administration will be chiefly remembered by the series of Acts passed in 1883-5 introducing a scheme of so-called local self-government, based on the inauguration of District Boards and subordinate bodies modelled on the English system of County Councils and Rural District

Boards. The powers of municipal boards were extended and the Government of India intimated that the chairman of a municipality should, whenever possible, be a non-official. Of course the principles of this scheme were drawn up on broad general lines only, the Local Administration being allowed a wide discretion as to the manner in which they brought it in. And it may be said that the degree to which the election principle was introduced or made use of varied widely in different parts of India. Anyone acquainted alike with some of the denser populated areas and the wilder parts of the continent will readily understand that this was inevitable; there were other reasons connected with religion, caste, traditions and so forth which introduced formidable obstacles against the rapid spread or recognition of the Western institutions. The District Boards were those known best to all district officials, the officers in charge of the various branches of the Service being represented on the Board. They were principally concerned with district roads, sanitation, education, famine relief and so forth. For many years it remained an open question as to how far these Boards justified the hopes Lord Ripon had formed of them. Those of us who, as district officials, have worked upon them in the past must have a very chequered and kaleidoscopic experience to look back upon. In the main there is little doubt that the greatest amount of talking was done by the Indian members, whilst usually (not always) when a decision had to be come to it was put up by one of the British official members in concrete form and then usually adopted. It is probable that, speaking generally, this was the position to the end of the period now dealt with.

As would naturally be expected, by the course of his administrative work during the four years of his viceroyalty, Ripon was extraordinarily popular with the people, who lamented his resignation. He was followed by a totally different type—an extraordinarily gifted man who possessed many qualities fitting him for the post, to wit, the Earl of Dufferin. When it is mentioned that before coming to India he had held posts in Syria, Turkey, St. Petersburg and Egypt it will be recognised that in his day he brought to the task of governing the country knowledge which enabled a later successor, Lord Curzon, to so eminently fill the post. From the political point of view (if we except the Panjdeh incident between the Russians and Afghans, which Dufferin's diplomatic skill enabled him to satisfactorily settle), as well as from the

forestry one, the outstanding event in the new Viceroy's administration was the outbreak of the third Burmese War, which resulted in the whole of Burma coming under the sway of the British.

The annexation of Tenasserim and Martaban in 1827 and of Pegu in 1852 as the outcome of the first and second Burmese Wars have been already alluded to in Volume I, Chapters VIII and XIV. The third Burmese War became almost inevitable soon after King Theebaw's accession to the throne in 1878. He was a man of ungovernable temper and of a revolting cruelty, and fully acted up to the part he conceived himself to be playing, to wit, the Ruler of the World. Encouraged by the British difficulties in Afghanistan and South Africa in 1879 and 1880 he started on a course of deliberate provocation. We withdrew our Resident from Mandalay in 1879, but with our hands full elsewhere still endeavoured to bring King Theebaw to reason and maintain the peace.

The cause of the final outbreak and declaration of war in 1885 is usually assigned to a dispute between the King and the Bombay-Burma Trading Company over teak timber. As will be shown, this was a contributory cause, but there was a political one which at the time it was obviously not advisable to make public. Early in 1885 the Governor-General received information that King Theebaw had concluded a treaty with the French Government, under which France was granted certain undesirable consular and commercial privileges. Lord Dufferin, a trained and skilful diplomatist, saw at once the impossibility of allowing a foreign power to intrude into the affairs of Burma, which had for a long period been regarded as the concern of India and the Indian Government only. Shortly afterwards, puffed up with pride and the belief in his own omnipotence, and it is believed acting under the suggestion of the clever but rather unscrupulous French Agent, Monsieur Haas, the King made an attack on the Bombay-Burma Trading Company. The Company was accused of illicit felling and other acts in the teak forests, charges which were never proved, and Theebaw imposed a fine of 23 lakhs of rupees upon them and ordered the arrest of some of their employés. If this action was really taken on the advice of the French Agent it was a most unwise move. The Indian Government, with the sanction of the Home Ministry, had no option but to despatch an ultimatum to the Burmese Court, demanding an immediate and final settlement to the various matters in dispute. King

Theebaw endeavoured to treat the difficulty in the Oriental fashion by sending an evasive reply to the ultimatum, whilst at the same time ordering his army to resist any attempted British advance. There was no real fight when the British crossed the frontier on November 14th. They advanced to Mandalay without meeting any serious opposition, and on the 27th Theebaw surrendered to the British General in a small summer-house in the grounds of the Palace at Mandalay, his capital. The King and his family were deported to India and settled at Ratnagiri in the Bombay Presidency. Upper Burma was then annexed by the British, a formal proclamation being issued on January 1st, 1886, just sixty years after the annexation of Tenasserim. From the first Lord Dufferin had made up his mind to annexation as soon as it became obvious that war would have to be declared on Theebaw. Although as a skilful diplomatist he made the timber quarrel the basis of his ultimatum to the King, his real reason and fears at this period are contained in the following extract from a letter written to the Chief Commissioner of Lower Burma: "If, however, the French proceedings should eventuate in any serious attempt to frustrate us in Upper Burma, I should not hesitate to annex the country; and, as at present advised, I think that this mode of procedure would be preferable to setting up a doubtful prince."

It was the threat of French interference from the side of Siam, coupled with Theebaw's own folly and callous cruelty, which finally settled the question of annexing Upper Burma and brought the whole of the Indian and Burmese Provinces under British dominance and government. There was now nothing left of any considerable size to annex. As is well known, the proclamation of annexation of the country did not mean peace. The regular war, which had been little more than a march, was followed by five years of guerilla resistance which necessitated a large number of troops, at one time as many as 30,000, being employed.

But civil government was gradually introduced into the country and the forests were brought under the Department, and finally matters settled down and the people enjoyed what they had never before experienced, an orderly rule, which rapidly resulted in an increased prosperity in the country. The magnificent forests which formed so large a portion of its wealth will be discussed later on in this history.

It was not till 1897 that Upper and Lower Burma were

united into a single Province under a Lieutenant-Governor. It was early recognised that this practically undeveloped Province was one of extraordinary richness and the possibilities in parts of it almost incalculable.

During the visit of the Prince of Wales, to Gwalior, in 1875-6, the Maharajah Scindia had hinted at his well-known ardent desire to have the famous Gwalior Fort, which had been termed "the pearl in the necklace of the Castles of Hind," returned to him. The fort had been taken by assault during the war with Gwalior in 1858 and retained by the British. It had been decided that the fort should be returned to Scindia, and it fell to Lord Dufferin in 1886 to make the welcome announcement and hand it over. Morar was also given up at the same time, the town of Jhansi being made over to the British in exchange. It is true that with the different methods of warfare and especially of fighting instruments, these old fortresses had no longer any value strategically. Nevertheless their rendition was greatly craved, and it was a wise policy which decided upon their restitution.

That the Royal Titles Act and the proclamation of Queen Victoria as Queen-Empress in 1877 was a far-sighted measure of the very first magnitude to the future of India was evidenced by the extraordinary enthusiasm displayed throughout the country during the ceremonials which took place on the occasion of the "Jubilee" of the Queen in 1887. As the years rolled on the Queen became regarded by the people with a deep veneration and cloaked with the garb of a goddess by the simple peasant and by numbers above that class. Those of us serving in India who witnessed the incredulous surprise and dismay of the people on the country-side and in the great forests at the news of her death were made to realise, as nothing else could have made us realise, that this was the case.

A knowledge of the various Tenancy Acts passed at times by the Indian Government is a first necessity to the Forest Officer in India. During the regime of Lord Dufferin three important Rent or Tenancy Acts regulating the rural economy of large provinces were passed by the Government. Briefly, these have been described as follows :

"The Bengal Tenancy Act of 1885, designed as an improvement on Act X of 1859, was based on the principles of fixity of tenure and judicial rents. The objection that it violated the terms of the Permanent Settlement was rightly disallowed.

The Governor-General had no difficulty in showing that the Act aimed at putting into practice the unfulfilled intentions of Lord Cornwallis.

The conditions in Oudh were different, tenant right or 'right of occupancy' being enjoyed by only a small minority of the peasantry. The legislature therefore sought to strengthen the position of the numerous tenants-at-will by granting them a statutory holding for seven years, with a right to compensation for improvements (1886).

In the Punjab, where the land is largely cultivated by the owners, the question of 'right of occupancy' is less urgent than it is in Bengal and the United Provinces. The Act of 1887 gave the protected tenants a limited guarantee against eviction and enhancement of rent. The relations between landlord and tenant everywhere present problems of such extreme complexity and difficulty that legislation on the subject never can attain more than an imperfect and moderate degree of success."

Lord Dufferin asked to be allowed to retire in 1888 after what was held to have been a successful administration. He was promoted in the peerage as the Marquess of Dufferin and Ava.

The four years of Lord Dufferin's viceroyalty had been eventful ones in the history of Forest Administration. Firstly, the Department had been transferred from the Home Secretariat to the revived Revenue and Agricultural Secretariat, on the ground that the interests of agriculture were closely connected with, and in many respects even dependent on, forest conservation. Secondly, the area of the permanent forest estate had increased very considerably, especially in the Madras and Bombay Presidencies, whilst the annexation of Upper Burma had added to the possessions of the Empire what was probably the most valuable forest property in the world. Thirdly, numerous working plans were prepared and put into operation, and the treatment and working of the forests was placed on a stable scientific basis. Fourthly, the recommendation of a Public Service Commission had resulted in a project for the entire reorganisation of the Department.

Lord Dufferin was succeeded by the Marquess of Lansdowne. Lord Lansdowne devoted much time to a settlement of the frontier. As a result of his policy and the visits of Sir Mortimer Durand to Kabul, the envoy travelling there without au

escort, the southern and eastern frontiers of Afghanistan were ultimately laid down by what is known as "the Durand line."

In Baluchistan the Viceroy's policy was carried out by a very able officer, Sir Robert Sandeman. In 1889 the Viceroy visited Quetta and was able to announce that the dreaded Bolan Pass, up which a railway now runs to Chaman 50 miles beyond Quetta, had become "a safe and peaceable highway." Lord Lansdowne built upon Lord Lytton's foundations, and the Great War proved the wisdom and soundness of their work.

There were two small frontier expeditions during this period; the first of small importance to the Forest Administration, the second of greater interest. The first of these expeditions was the Hunza and Nagar, 1891-2, when a gap in the defences of the north-western frontier was closed by the occupation of Hunza and Nagar, two small principalities whose chiefs, from their almost impenetrable fastnesses in the great mountains, had imagined that they held the keys of the world! Hunza and Nagar are situated in the Gilgit Valley, and command the road to Chitral and certain passes over the Hindu Kush. These almost inaccessible forts were captured by Indian troops after a display of extraordinary gallantry.

The second expedition, that of Manipur, came about owing to a disputed succession. The Rajah had been deposed and the Government of India decided to place a boy on the throne and exile the Commander-in-Chief, a brother of the deposed Rajah. Mr. Quinton, the Chief Commissioner of Assam, was ordered up to Manipur to carry out the arrangements, and proceeded there with an escort of 500 troops. Fighting took place till sunset on March 24th, 1891, the Commander-in-Chief refusing to accept the terms. He then asked for an interview, at which the British officers were treacherously attacked, Mr. Quinton and some of his staff were captured and beheaded by the public executioner. The escort retired to Cachar. This outrage was avenged at the end of April, the Commander-in-Chief and his accomplices being hanged and the boy placed upon the throne. The State, a small hill, forest-covered principality (credited with being the originator of polo), was administered by a Political Agent, who introduced many reforms during the time the young Rajah was being educated at the Mayo College.

The question of exchange and the value of the rupee, of great interest to all serving in India, had been for long the subject of discussion and much heart-burning, not unaccompanied by

serious commercial loss. Legislation introduced by Lord Lansdowne in 1893 had for its object the closing of the mints against the free coinage of silver and the introduction of gold as a legal tender. The aim was to standardise the rupee at 1s. 4d. It was also decided to grant compensation allowance when the exchange was below 1s. 4d. so as to bring the salaries of officials up to that rate.

In 1894 Lord Lansdowne was succeeded by Lord Elgin, the son of the peer who had been Governor-General in 1862-3. Two frontier expeditions, Chitral and Tirah, took place in 1895 and 1897. The latter was by far the most formidable, and the best part of two years were passed in stamping it out. The Afridi clans closed the Khyber Pass. It took some 40,000 troops to break (for the time) the resistance of the clans. During the war the valleys south of the Pass, until then unexplored, were penetrated, and a considerable amount of work of interest to the geographer and other sciences was carried out.

Lord Elgin's administration will be chiefly remembered for the calamities of plague and famine.

Bubonic plague, a pestilence of which there were prior records in India—in 1616 (recorded by Jehangir as widespread in Northern and Western India), 1703-4 (Deccan), 1812 (Cutch and Sind) and 1836 (Rajputana), appeared at Bombay in 1896. It spread gradually to every Province, and had already invaded a considerable amount of country at the end of the period now dealt with. Extraordinary opposition was aroused at the quarantine regulations imposed by Government during the first years of the outbreak in the endeavour to stay the spread of the fell disease, riots being of frequent occurrence.

Of greater importance to the Forest Officer were the famines which periodically visited India as a result of the failure of the monsoons. Gradually, as the value of the forests became more widely appreciated amongst the official element, their utility in times of famine was realised, and to the Forest Officer was allotted his broader and proper sphere in the measures taken to assist the afflicted population. But it was some years before this stage was reached. It was obtaining a slow recognition by the end of the period now reviewed.

Allusion has already been made to the great famine of 1876-8. Owing to the failure of the monsoon in 1876, Mysore, the Deccan and large areas of the Madras and Bombay Provinces were exposed to a serious famine.

The position in Madras soon became alarming owing to the attitude of the Governor, the Duke of Buckingham, and his administration in strangling private trade and attempting the impossible task of providing all supplies through Government agency. Lord Lytton insisted on the reverse policy and had taken advantage of the Imperial assemblage at Delhi in January, 1877, to explain his views to the governors and heads of provinces who were gathered together there. The Duke of Buckingham adhered to his own idea on his return to Madras, and the Viceroy was forced to undertake the long journey to the south to enforce his decision. Bombay had carried out Lord Lytton's famine policy, with the result that the business was so well managed that the cost incurred was £4,000,000 sterling only, with a considerable saving of life, whilst Madras spent £10,000,000, in spite of which the loss of life was, in the Viceroy's own word, terrible.

In the second year the famine extended to parts of the Central Provinces and the North-West Provinces with a small tract in the Punjab. The total area affected was estimated at 257,000 square miles with a population of more than fifty-eight millions. The excess mortality in British India alone was considered to exceed five millions, exclusive of the large number of deaths in the Native States.

The drastic reforms introduced checked the abuses, but nothing could prevent heavy mortality. Large regions were bare of food of any kind. The injudicious early interference with private trade no doubt had much to do with the failure of supplies. In an address before the Legislative Council in December, 1877, Lord Lytton enunciated his sound principles of famine relief and obtained sanction to the appointment in the following year of the first Famine Commission, which submitted its report in 1880. This document is considered to be the foundation of the existing elaborate provincial Famine Codes. The Viceroy desired to allocate large sums to the construction of railways and irrigation works as preventives to famines, but was frustrated by orders from the Home Government restricting this expenditure within narrow limits. But Lord Lytton's far-sighted proposals were to be put into force at a later period.

The next famine of serious note was that of 1896-7. This famine was believed to have been the most serious ever known, and was estimated to have affected a population of nearly seventy millions. Its greatest severity

was experienced in the North-West Provinces, the Central Provinces, Bihar, and the Hissar district of the Punjab. All the statistics go to prove that this famine was on a gigantic scale. It was ably fought by Sir Antony MacDonnell (now Lord MacDonnell), the Lieutenant-Governor of the North-West Provinces and Oudh. The work in the Central Provinces, a difficult country to operate in, owing to the paucity of its communications at the time, was less successful. A Commission under Sir James Lyall reported on the results in 1898, and again discussed the much-debated question of the principles of famine relief.

The last famine of the period coincided with Lord Elgin's departure and the arrival of Lord Curzon as his successor as Viceroy in 1899. This famine became formidable in 1900 and falls within the next period of this history.

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science and scientific knowledge were of little account and to whom therefore forestry as a scientific study was unknown. There is no intention here to belittle a classical education—in the writer's opinion some knowledge of the classics is not only useful but almost indispensable to the Forest Officer. But a boy with a purely classical training will rarely make a good Forest Officer ; nor until within comparatively recent years have men so trained found it easy, in the majority of cases, to appreciate the objects and importance of a sustained forest policy or visualise its necessity in the economic needs of a country and its people. In considering the past history of the development of the Department in India the importance of this factor on its progress cannot be overlooked or its effects minimised. The other deterrent to more rapid progress is more readily recognised, the fact that as a preliminary to the real conservation and administration of the forests on the countryside the people with their Oriental conservatism and apathy had to be gradually weaned from their old methods of utilising—wastefully utilising—the forests and educated to a recognition of the fact that the work being carried out was in their true interests. Having alluded to the two main factors which had a deterrent influence on the progress of the Department, the main lines of development will be now glanced at.

It will be remembered that in 1866 Brandis secured the services of two young fully trained German forest probationers, Schlich and Ribbentrop. Schlich was sent to Burma and in 1870 was transferred to Sind. Ribbentrop commenced his career in the Punjab. These two officers followed Brandis as Inspectors-General. Brandis was placed on special duty in October, 1881, and retired in April, 1883. Schlich, who officiated as Inspector-General for Brandis from October, 1881, was confirmed in the post on Brandis' retirement, finally retiring from the Service in December, 1888. Schlich, however, went home in February, 1885, to start, as Professor of Forestry, the training of future forest probationers at Cooper's Hill, to be referred to in another chapter. Ribbentrop became Inspector-General on Schlich's departure from India and retained the post until his own retirement in 1900. The following additional officers officiated as Inspectors-General of Forests from the institution of the post to the end of the period here dealt with : Captain E. C. S. Williams, R.E., from 13th April, 1865, to 7th May, 1866 ; Dr. H. Cleghorn, from 7th May, 1866, to 14th March, 1867 ; Colonel G. F. Pearson,

FOREST ADMINISTRATION PROGRESS, 1871-1900 463

M.S.C., from 29th January, 1871 to 20th December, 1872 ; Mr. B. H. Baden-Powell, I.C.S., C.I.E., from 30th December, 1872, to 8th April, 1874 ; Colonel F. Bailey, R.E., LL.D., from 3rd August, 1887, to 31st October, 1887, and Mr. H. C. Hill, C.I.E., from 7th August, 1889, to 1st March, 1891, from 22nd December, 1893, to 21st March, 1894, from 19th February, 1895, to 1st April, 1896, and from 8th July, 1899, to 8th October, 1899.

The period to be here dealt with chiefly covers, therefore, the administration of the Indian Forests by Forest Officers of German nationality and training, and was to a very considerable extent influenced by German ideas in the management of forests. At the time Germany was admittedly one of the foremost nations amongst those whose forests were managed on scientific lines. A study of the German system and methods was indispensable in the training of the probationer. It is open, however, to question whether the attempt to strictly apply Germany's rather hard-and-fast methods based on axiomatic dicta and calculations had not its drawbacks in the case of the Indian forests ; whether the application of French methods in addition would not have resulted, in some parts of India at least, in a more rapid progress. Whether, in fact, the views of Indian Forest Officers were not in danger of becoming stereotyped in the effort to slavishly copy and apply methods remarkably successful when applied to comparatively small individual forest areas, but perhaps somewhat stultifying to the larger viewpoint and individualism required in the management of forests covering such large areas and of so varying a character as those of India. A close study of the history of the period renders these reflections inevitable, since they furnish answers to several problems which arise in its consideration. The work which had to be carried out was a task of Hercules and it was ably performed. But if we refer to the forest literature of the period emanating from the pens of Indian officers, the great bulk of it, with a few brilliant and notable examples, refers to the continental forests of Europe. At the end of nearly half a century's work the Department knew but little of the silviculture of even its principal trees. This fact alone may perhaps be left to illustrate the position of the Department in this connection. Special research work by officers deputed for the purpose had not been attempted. Too great stress had been laid upon the financial side of the operations of the Department as a purely commercial and

revenue-making concern to the detriment of progress in work of a professional nature which, as a matter of fact, as is now fully realized, would have resulted in a quicker enhancement of the revenue. At the commencement Brandis had to justify the inauguration of the Department by something more than covering the cost of its maintenance, and the successful organisation he introduced was fully justified; but the history of the Department through the period tends to show that this policy became fixed and remained for two long a guiding factor in the administration of the forests. In other words, for some years after the spade-work in connection with the demarcation of the forests, their opening out by roads and so forth, had been in the main accomplished in the more accessible regions, and when the extraordinary increase in the prosperity of the population and their demands upon the forest estate would have justified the introduction of a more liberal financial policy.

THE STATE PROPRIETORSHIP IN THE LAND

One of the first questions to arise after the organisation of the Forest Department, as will have been already realised, was—What was the State proprietorship in the land? This proved a very involved problem, since the State proprietorship of forest land varied in accordance with the historical and political development of each Province. With certain broad provisions laid down by the Supreme Government the settlement of this grave question had to be left to the various Local Administrations. The question was intimately connected with the framing of the various forest Acts, to be shortly discussed, and the Inspector-General was consequently consulted in this matter both by the Supreme and Local Governments. Under the general trend of British policy in governing India it had been ruled that when the population had settled in joint village communities any forest or waste land that fell within their boundaries was considered common property. This recognition formed the basis of all settlements made after the occupation of the country by the British. In many parts, although the policy was a perfectly just one, it was short-sighted, since with the growth of the village communities which were such a marked result of the orderly British rule the forests on the lands so allotted was wastefully utilised and rapidly disappeared, leaving barren areas over which the half-starved

cattle roamed in search of a sparse pasturage, whilst the fuel supplies of the community disappeared.

In the case of un-united villages no right to the waste was ever recognised. The old Rajahs claimed all areas which were not actually brought under cultivation, but any person who required waste land for the purposes of cultivation could obtain it without difficulty on agreeing to pay the assessment in force. The rest of the waste land had always been recognised as the property of the rulers, and from them was inherited by the British Government by right of conquest. In some cases the cultivators had acquired prescriptive rights of user. It was rights of this nature which were to prove, and are still proving in many instances, such a source of trouble and difficulty to the Forest Department, and more especially to the framers of working plans for forests which have now been under systematic treatment for several decades. For these prescriptive (and usually wasteful) rights of user are often incompatible with the scientific and economic working of a forest.

In its broad aspects it will be obvious that when the united villages were numerous and therefore close together, as in the plains of the North-West Provinces for instance, and in parts of Bengal, the whole of the forest land was rightly claimed as the property of the people, with after results which will be dealt with in the development of this history. For the forest which once clothed them has disappeared, leaving howling wastes, the reafforestation of which is proving a formidable task to the Department.

Earlier parts of this history have shown that a considerable period of years elapsed before it was realised that definite action would have to be taken if the existing forests were to be preserved from the ruin and extinction to which a considerable area in the country had been subjected from the beginning of the century. As preceding chapters will have clearly indicated, it was due to the insistence of successive Secretaries of State for India on the necessity of introducing a proper conservation of the forests that this matter was given its rightful place in the administration of the country. It is a remarkable fact, and one meriting full recognition, that in this particular respect and one so vital to a great agricultural country like India the driving force should have come from the responsible authority at home. Two instances are worth quoting illustrative of the opinions of men in high office on this branch of administration. Soon after Brandis took up his work as adviser to the Supreme

Government in forestry matters he became aware that the new beginnings of forest administration were in a perilous position. He wrote, in an address some years after his retirement : " When Sir John (afterwards Lord) Lawrence landed at Calcutta in January, 1864, as Governor-General he had determined to stamp out this new-fangled scheme of forest administration, which would weaken the position of the Chief Civil Officer of the district by taking away from him the charge of the forests. It was only through the fortunate accident that Sir Richard Strachey, at the time Secretary to the Government of India in the Public Works Department, who had some time previously taken charge of the forest business, gradually gained influence over the Governor-General to such an extent that actually in Sir John Lawrence's reign the forest establishments under the Government of India were placed on a regular organisation." Perhaps Brandis is not quite correct in awarding all the praise to Strachey, for the Secretary of State (*vide*, Despatch of 1862, I, p. 530) had taken up too strong an attitude in this matter for a retrograde policy of a Governor-General to have had any chance of success. But Sir J. Lawrence's attitude, the attitude of the bulk of the civilians at this time, of whom he himself was one, is typical of the position which the young Department had to face. As will become fully apparent later on, the manner in which it was faced reflects the greatest credit on both the Services. For it may be remarked for the benefit of those unacquainted with the conditions of Indian Service that the officers of a district, often comprising a small community of three to five, must pass much of the year in constant contact, both officially and privately, their social recreations being naturally restricted. That these first trying years should have been followed by a mutual recognition and admiration of the work being done by each appears worthy of record ; for by no other means could the present efficient forest organisation in India have been built up.

The other instance alluded to above comes from that great soldier the late Field-Marshal Lord Roberts, V.C. Although enunciated later than the period here dealt with (in his book, *Forty-one Years in India*, Vol. I, pp. 441, 442), the opinions expressed in the quotation to be given were formed during the present period. Roberts wrote : " Amongst the causes which have produced discontent of later years I would mention our forest laws and sanitary regulations, our legislation and

fiscal systems—measures so necessary that no one interested in the prosperity of India could cavil at their introduction, but which are so absolutely foreign to native ideas that it is essential they should be applied with the utmost gentleness and circumspection. . . . The proceedings and regulations of the Forest Department, desirable as they may be from a financial and agricultural point of view, have provoked very great irritation in many parts of India. People who have been accustomed from time immemorial to pick up sticks and graze their cattle on forest lands cannot understand why they should now be forbidden to do so, nor can they realize the necessity for preserving the trees from the chance of being destroyed by fire, a risk to which they were frequently exposed from the native custom of making use of their shelter while cooking, and of burning the undergrowth to enrich the grazing.”

As has been said, a considerable period elapsed before the recognition of the importance and necessity of conserving the forests came about. But even with this recognition it was not at first appreciated that special legislation would have to precede the settlement of the forests and their constitution into reserves. In some provinces, in the Madras Presidency for instance, the recognition came very late owing to the *non possumus* attitude taken up in this matter by the Board of Revenue.

Legislation had then to precede settlement, and it will therefore be necessary to consider the course of forest legislation during the period now being dealt with. The Department was very fortunate in having the services of Mr. B. H. Baden-Powell, a member of the Indian Civil Service, who was attached for a considerable number of years, becoming Conservator of Forests in the Punjab and officiating as Inspector-General of Forests. Mr. Baden-Powell gave great assistance in placing forest legislation on a sound basis.

FOREST LAWS

The drafting of proper forest laws for the different provinces was considered between 1869 and 1878, with the exception of Madras. The first question which came up for settlement was to what extent the long-continued right of user, i.e. the free collection of small produce such as fuel, grass, bamboos, grazing and shifting cultivation in the waste lands, should be regarded as constituting a prescriptive right. It was

deliberately settled that the customary user of the forest under British rule must be held to constitute a prescriptive right. On the other hand, it was acknowledged that Government, as the guardian of all public interests, must insist on the regulation of these rights so as to render possible a good management of the reserved forests in the interests of the country.

It was held that the growth of forest rights in India had been analogous to the growth of similar rights of user in Europe, and consequently that the legal provisions for regulating them or, in case of need, for extinguishing them by means of suitable compensation, must be analogous to the forest laws of Europe. In some cases, for instance, rights of user had been acquired by grant or *sanad*, and in others the officers in charge of the earlier settlements had given up the right of the soil to the villagers, and reserved to the State only the trees growing on the land. It became necessary, therefore, to definitely distinguish between forests in which the right of the State was still absolute; forests which were the property of the State but which were burdened with legal rights, prescriptive or granted; and forests which were the property of individuals or communities, but in which the State had rights over all or certain kinds of growing trees, and then to provide for a legal settlement on these points.

It has been shown in the preceding part (p. 8) that the first Indian Forest Act (Act VII) was framed in 1865. Within a few years the provisions of this Act were found to be insufficient in some cases for application to certain provinces and a new Act was drafted by Brandis in 1868.

The earlier forest laws which were passed are illustrative of the great difficulties which had to be overcome before a comprehensive and practical measure was devised for a legal definition and separation of rights in forest property.

The first beginnings in this direction, detailed in Volume I, were in the form of local rules which were promulgated in several provinces. It was considered at the time that such rules, although they had not the force of law, would prove sufficient. Both Civil Officers who had the management of forests and Forest Officers were able in time to show that this contention was fallacious. By the end of the nineteenth century the only set of rules which had not been repealed were the Hazara Rules which, based on earlier ones (I, p. 275), were issued in 1875, recast in 1878, and finally amended in 1893. These rules provided for the creation of State forests.

under the Land Revenue Settlement and were therefore unobjectionable.

Under the first Indian Forest Act (VII), framed in 1865, a large number of local rules were promulgated (*vide*, Chap. I).

The only rules under this Act which fall into this period were those of Berar, Coorg and Bengal, all promulgated in 1871.

It was soon discovered that the 1865 Act did not give validity to certain rules relating to forests in British Burma, and Act VII of 1869 was passed for this purpose. This latter Act was repealed by Act XIII of 1873, known as "The Burma Timber Act."

Act VII of 1865 proved seriously defective for certain portions of the forests of British India to which it applied. A revised Bill and a Memorandum explaining the necessity for new legislation were submitted to the Government of India by Brandis in 1868. The Local Governments were asked to express their opinions on the draft Bill, which was then redrafted and was again considered by the Government of India in 1871. At a Forest Conference held at Allahabad in 1873-4, the defects of Act VII of 1865 were discussed in detail. The Honourable Mr. Hope clearly enunciated the chief deficiencies of the Bill in the Viceregal Council on 6th March, 1878, as follows :

" It drew no distinction between the forests which required to be closely reserved, even at the cost of more or less interference with private rights, and those which merely needed general control to prevent improvident working. It also provided no procedure for enquiring into and settling the rights which it so vaguely saved, and gave no powers for regulating the exercise of such rights without appropriating them. It obliged you, in short, either to take entirely or to let alone entirely. On control over private forests in the general interests of the community, it was absolutely silent. For duties on timber, even those actually levied, it gave no authority. Protection for Government forests, so interlaced with private ones as to be in chronic danger of plunder, there was none. In various minor points also it was deficient."

This clear exposition of the inadequacy of the Act to achieve the objects aimed at sealed its fate.

A new Act (Act VII of 1878) was passed and remained in force during the period. This Act extended to all the provinces of British India, with the exception of Madras, Coorg, Burma,

Berar, the Hazara district of the Punjab, Ajmere and Baluchistan.

This Act provided for the constitution of "Reserved" forests and "Protected" forests. In the first draft of the Act it was intended to form only one class of demarcated State forests (reserves), and to provide for a limited protection of all other Government forest lands generally until the time arrived in any particular area when it could be decided definitely which particular forests or forest area should be demarcated and constituted reserved forest. This was modified in the Act as passed. The Act does not impose the demarcation of an area before it can be declared a protected forest, but it requires that the nature and extent of the rights of Government and private persons should be enquired into and recorded previous to the forest being declared a protected one, or should it prove necessary to declare a forest a "protected" one without delay, it imposes on the Government the duty of instituting such enquiries; existing rights are protected by the Act pending such enquiries. The guarantee so afforded the protected forests was, however, an unstable one. For whereas a reserved forest once notified was safeguarded against any possible infringement of private rights and secured a permanent settlement, in the protected forest existing rights were recorded but not settled. Such rights might increase and new ones arise without any limitation, with the result that the forest might eventually disappear and with it the rights of user. This aspect of the position became apparent to the Local Governments, with the result that protected forests were gradually converted into reserves. The work took time, and for many years the demarcation work absorbed the time and energies of a large part of the staff. This favourable outcome was the result of reiterated injunctions from both the Secretary of State and the Government of India that the selection of the remaining valuable forests and their demarcation should be undertaken without intermission. In 1889-90 there were 56,000 square miles of reserves and nearly 20,000 square miles of protected forests. By the end of the century the reserves extended to 81,400 square miles, whilst the protected forests had an area of 8800 square miles only.

Chapter III of the Act was intended to provide for the constitution of village forests. It was admitted that village communities and private persons had a right to expect that Government should afford protection to their forest property.

both against trespass and damage, and also against the accrual of new rights. The procedure of the Act demanded that the forests should first be created reserved forests, and this provoked the suspicion of the owners with the result that the Chapter throughout the period here dealt with had remained inoperative.

The Indian Forest Act was not extended to Burma owing to the objections of the Chief Commissioner. These were chiefly based on the misunderstandings to which Chapter IV and its title were likely to lead. A separate Act (Act XIX) was therefore framed for Burma in 1881. A Chapter of this Act, practically identical with Chapter IV of the Indian Act, but not providing for any record of rights, afforded some protection to all Government waste and forest lands until such time as the selection and demarcation of State forests (reserves) should have been completed. When this work should have been accomplished it would be possible to abandon all worthless lands should it be deemed advisable hereafter ; unless they contained scattered teak trees, which being " royal " trees belonged to Government. Powers under an Act of this description were essential for Burma where the area of forest was enormous, the forest staff small, and where it was obvious from the first that demarcation work would take a long period to achieve. The Chapter on the village forests, wrote Ribbentrop, " purports to be an improvement on the Indian Act, but so far it has not proved workable, for the reason that a clause (34) has been inserted to the effect that any existing rights of any persons in or over any village forest shall not be affected. Without the curtailment of certain rights of user, or at any rate the regulation of the enjoyment of such rights, nothing could be gained by constituting the forest a village forest, beyond a guarantee against new rights. As, however, such forests as it is most necessary to bring under this Chapter have been or are being indented upon to such an extent as to endanger their existence, their permanent maintenance can only be assured by bringing the concessions to villagers within the possible yield of the forests."

A stern truth which had forced itself uncompromisingly upon both Government and public alike in parts of India outside Burma before the close of the century ; and as is evidenced in some of the latest working plans is still presenting problems for solution at the present time—a forestry version of the copy-book maxim—You cannot eat your cake and have it !

It has been already mentioned in the preceding part that the

Madras Government refused to have Act VII of 1865 extended to that Presidency, on the plea that the rights of the villagers over the waste lands and jungles were considered to be of such a nature as to prevent Government from forming independent State forest property. This attitude, as the history of the Madras Forests already given has shown, had been persisted in for half a century. Madras had lost its pride of place and lead in initiating forestry organisation mainly through this attitude on the part of the Board of Revenue. But in time the truth of the copy-book maxim forced them to reconsider the position. Two separate drafts of a Forest Bill for the Presidency were submitted, and an Act for the Presidency was finally forwarded to the Governor-General in Council for concurrence. This Act proved unsuitable from an administrative as well as from a legal point of view and was vetoed in Council. In October, 1881, Brandis was deputed to Madras to study the forestry question on the spot, as will be detailed in a later chapter. One of the most important of the many valuable results of the visit was the drafting and passing of the Madras Forest Act V of 1882 which came into force on the 1st January, 1883.

The Madras Act was framed on the same general lines as the India and Burma Acts, but was considered by some authorities to be an improvement in several points. It was held that the Chapter on the constitution of reserves was more logically arranged, the procedure being somewhat simplified. The procedure dealing with the protection of Government land not included in reserved forests, which is analogous to the Chapter on protected forests in the Indian Act, is a great improvement even on the Burma Act. But the Madras Act was held to have one grave defect, in that it admitted of an appeal or suit beyond the District Forest Court, from which there is no appeal in the other Acts.

A large extent of country had in several provinces already been placed under some sort of reservation under the provisions of Act VII of 1865 ; and in order not entirely to lose the results of previous work, a provision was entered in the modern enactments by which Government was empowered to declare any such areas reserved and protected forests, under the proviso that any rights of Government or private persons over any land and forest produce in any such forest had been enquired into, settled, or recorded in a manner which the Local Government thought sufficient, or would be thus enquired into, settled and

recorded after the declaration if the former enquiries and settlement were considered insufficient.

"All three Acts," wrote Ribbentrop, "provide for the control over forests and lands not belonging to the State, if such control appears necessary for the public weal, or if the treatment such forests have received from their owners injuriously affects the public welfare or safety; but the provision that the owner of the land can require the Government to acquire the land in question under the Land Acquisition Act has rendered special legislation necessary when such interference was deemed necessary, as for instance in the Hoshiarpur *chos* in the Punjab, which will be alluded to later."

As has been detailed in Chapter I of this volume, sets of rules were promulgated by the Local Governments under the several sections of Act VII of 1865. Similarly, under the new Forest Acts for India, Burma, and Madras numerous sets of local rules were drafted and passed after the Acts came into force. These varied in different parts of the country and had been added to or modified during the period here considered as became necessary. Those issued under Chapter IV often differed from district to district and varied in the same district. Although this may produce some sense of bewilderment to the uninitiated it will be readily understood that such variation is inevitable. For instance, in a district where the forest material is all water-borne, in other words floated down from the forests, the rules made under the Act governing extraction and transit must of necessity vary from those required to protect material extracted by road, railway, or in the case of the mountainous country of the Himalaya and elsewhere, brought out by slides, ropeways and so forth. Again, different rules are required to safeguard and check timber passing during its transit through Native States or coming into British territory from such States. The description of these rules already given will prove sufficient to explain their nature.

Special legislation was required for Berar, Baluchistan, Upper Burma, and Assam, which were non-regulation provinces governed under simpler codes than were in force in the rest of India. The Berar Forest Law was passed in 1886. All waste land in Berar which had not been alienated under settlement was the indisputable and entire property of the State. The creation of State forests was simple, since it merely entailed a selection of the areas it was desired to reserve, the sections in the Act required for this purpose being of a simple nature.

Baluchistan was in much the same position, and a simple Forest Regulation was passed for this Province in 1886 and amended in 1890. Upper Burma was not included in the Burma Act, since the country had not come under the dominion of the British at the time, and the provisions of the Act were not suitable to the newly acquired and totally undeveloped territory of the north. A measure termed the Upper Burma Forest Regulation VI was passed in 1887. Generally speaking, it resembled the Burma Forest Act in a simpler form, and was identical with regard to the creation of reserves and the settlement of rights. This Regulation was amended in 1898. In the important matter of shifting cultivation it was distinctly laid down that the practice of this method of cultivation at the expense of the forest conveyed no right and could be abolished at the pleasure of Government.

It had taken many years, but we had thoroughly learnt our lesson by 1887 in India. In other parts of our Empire this lesson, however, still remains to be assimilated by the Administrations responsible.

The Upper Burma Regulation was extended to include the Shan States in 1890. Lastly, for Assam a Forest Regulation based entirely on the Upper Burma Regulation was sanctioned and brought into force in 1891.

Such additional details on the working of these Acts as may be necessary will be given later under the individual provinces.

FOREST SETTLEMENTS

The table opposite, compiled in the Inspector-General's Office and published in Ribbentrop's *Forestry in British India*, indicates the results of forest settlement work up to the end of this period. It was considered that the entries under the categories "Reserved" and "Protected" forests could be claimed as accurate, the areas under "Unclassed" forests being estimates.

This table indicates the great progress made in this laborious settlement work between 1870-1900. The reserved forests were regarded at this period as forming the only trustworthy resource for the future, and these, it will be seen, only formed 8.6 per cent of the total area. Their distribution was very unequal. Berar had 23; the Central Provinces, 22; Burma, 9; the North-West Provinces and Oudh, 3.6 only and the Punjab only 2 per cent of Government Reserved Forests.

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Ribbentrop describes the objects of Forest Settlement Work as follows :

" The various forest laws in India make it quite clear that the object of a forest settlement is, in the first instance, to fix and define the legal status and extent of the proprietary rights of the State in any forest or waste land, constituted or declared to be forest within the meaning of the forest laws, and, consequently, to enquire and record to what extent the proprietary rights of the State are limited by legally existing adverse rights of private persons or communities ; secondly, to arrange for the exercise or commutation of adverse rights so recorded, in order to allow of the property being managed with the view of obtaining the best possible return, both for the present and in the future, for the general public.

The settlement of a forest, which has resulted in its constitution as a reserve, merely determines the rights of the Government and private persons over the forest, and in no way aims at prescribing the agency by which, or the manner in which, the forest is to be administered. The way in which a forest may be managed, or the requirements which it is intended to meet, are, in every instance, dictated by local circumstances. Thus a reserved forest has not, necessarily, the object, as is frequently believed, of producing large timber for export or public works ; but more often that of supplying the local demands in smaller timber, fuel, grass, or any other forest produce. A forest may be said to fulfil its highest function when it produces, in a permanent fashion, the greatest possible quantity of that material which is most useful to the general public, and at the same time yields the best possible return to the proprietor."

As this history will have shown a long period of years elapsed before this recognition, this definition, it may be termed, of the objects to be fulfilled by a " Reserved Forest " came to be assimilated in India. In other parts of our Empire, and, in fact, of the world, as, e.g. the French West African forests, it has yet to be understood. In these regions many years' work and many mistakes may be saved and avoided by a study of the lines of progress in India. Ribbentrop continues :—

" The settlement of forest lands under the forest laws is a step which fixes for ever the respective rights of the Government and private persons over the lands ; while the management of the forest is a matter that can be regulated by executive orders at any time, and in deference to altered requirements and varying demands. However, the legal obligations imposed at the time of settlement are the first charge on the management.

The rights claimed and admitted during such settlement must be actually existing rights, vested in an individual or person, or

in a definite body of persons, such as, for instance, a number of co-owners or a village community. They may be rights in gross, unconnected with the ownership of immovable property (house or land), or they may be rights attached to the ownership of such property. They may be rights enduring only for a certain period, or for the life of the person in whom they are vested, or they may be rights which will pass to the heirs of that person, or pass in perpetuity with the property to which they are attached. But they must be existing and vested in some person, or body of persons, who can claim them at the time of settlement.

Under any circumstances, the burden which the forest property has to bear is, as the laws stand, clearly defined, the amount of timber or firewood which it annually owes to right-holders should be fixed in perpetuity, as well as the number of cattle which may graze in it and the seasons during which they are to be admitted, and, finally, the total extent of right should never exceed the productive power of each forest property.

The majority of forest settlements have been made on this strictly legal basis. They do not preclude Government from utilising the areas settled in any way they may think fit, or to benefit the surrounding population by the free grants of forest produce contained in such reserves."

Under the Indian Forest Acts the duty of deciding upon the legal status of claims to be admitted as rights was entrusted to special officers styled Forest Settlement Officers, and an appeal from their decision is provided. The whole of the area of 81,400 square miles of Reserved Forest was constituted in this fashion. In many cases it proved possible to extinguish pernicious rights by compensation; in others, the forest remained burdened with rights of pasture or wood cutting; but these rights were strictly defined both as to area, number of grazing animals or amount of produce to be taken out. In many cases the Settlement Officers of the past were too lenient and in ignorance of what a forest could produce, and with the object of placating the villagers of their day went beyond the letter of the law and placed burdens on the Government Reserves which restrict their efficient management and the amount of produce they can economically yield. In this connection grazing proved the greatest difficulty. Most Settlement Officers and the Local Administrations during the period here reviewed appeared to find it difficult to understand the great damage overgrazing in a forest area could accomplish—and this in spite of all the lessons of the past. That the forests should be thrown open to unrestricted grazing in times of famine was admitted by all. The difficult lesson to learn proved to be the absolute necessity of regulating the number of animals admitted per square mile of area, which naturally varied with conditions of soil, moisture, declivity, etc.

DEMARCATIION

As soon as the settlement of selected forests had been effected it became necessary to permanently demarcate them on the ground. This involved a very large amount of heavy work, and until the Department grew in strength, progress was inevitably slow. Great energy was shown in the performance of this gigantic task, and with the increase in the personnel of the Department the rate of demarcation advanced annually in every Province. By the close of the period here reviewed 93,068 miles of boundaries out of 141,204 miles requiring artificial demarcation had been laid down on the ground with the necessary posts which were serially numbered for individual blocks of forest; this great length of boundary was reported in effective condition at the close of the century. Boundary registers were also opened, giving a detailed record of the boundaries with the number and position of the posts, which were erected on a line or trace from which all trees and jungle had been cut, thus clearly demarcating the forest area from neighbouring lands. The forward and backward angles of the posts were also entered in the register in order to enable them to be replaced in case of removal or destruction—a not infrequent occurrence. The curiosity or playfulness of elephants in this connection was particularly annoying in the early days of demarcation. Man himself was, however, not entirely innocent of abuse in this matter. In some parts of the country, where stout wooden posts inserted in mounds of earth or stones were utilised with a metal number-plate attached, the jungle tribes made a practice of carefully removing the metal plates in order to fashion arrow-heads, and so forth, from them. At times the posts were removed bodily with a deliberate intent to obliterate all trace of the boundary line in certain localities.

Whilst the writer held charge of the Chittagong Division continual trouble was experienced in connection with the intricate boundaries of the small patches of district forests, the boundaries having numerous small re-entering angles bounding the highly valuable cultivated land. The villagers when ploughing up their small fields would take in a few yards of the boundary line or the whole of the piece adjacent to their field. The litigation resulting from such acts threw an additional burden on the overworked Forest Officers. These are for the

most part experiences of the past in the greater part of India, but still persist in the less developed areas.

FOREST SURVEYS

In his *Forestry in India* Rippentrop gives a very clear exposition of the progress of the survey and demarcation work of the forests to the end of the century. With a few modifications this is reproduced here.

Almost from the very outset it was found that the ordinary topographical maps were insufficient in accuracy and scale for the purposes of forest administration, and as the areas set apart as State forest property increased, and a more systematic and conservative treatment was gradually introduced, the demand for suitable maps grew more and more acute. For several years this want was supplied by provincial and local agency, but it soon became evident that these efforts were in most instances not sufficiently controlled. Here and there, no doubt, useful and reliable maps were produced, but generally speaking the administration obtained insufficient *data* in comparison with the amount of money which was spent on surveys throughout the country, and the maps varied far too much in character to make them generally intelligible and useful. There was a great variety in scales and in the signs and colours used to indicate topographical detail and the character of the forest, which varied in each Province and frequently within one and the same Province; and even those maps which sufficed for local requirements were generally useless for geographical purposes, as they were unconnected with each other or with the surveys executed by the Survey of India. It may be added that the forest areas having been regarded in the past as of little value the smaller topographical details had been often merely sketched in from a hill-top in some of the Survey of India maps which showed forest areas. It was essential to the Department that accurate maps of the forests should be available. As an instance, the following may be quoted :

The writer, soon after joining the Service, was sent to check a portion of a map showing roughly the features of a bewildering mass of forest-clad hills in Chota Nagpur. One morning he ordered his camp to meet him at a certain spot, indicated on the map, on the banks of a small stream. The writer marched to the spot by a longer route. He reached the place arranged

upon at nightfall, found that the stream *ran in the contrary direction* to that shown on the map, and as it turned out afterwards the guide with the camp and servants using his own local knowledge had led them to a point some ten miles distant. No disparagement of the magnificent work of the Survey of India is intended. When the map in question was drawn the forests had no value whatsoever, and therefore a rough and inexpensive survey of this area was all that was necessary.

The annual accounts of the early forest surveys made showed a gradual but steady increase of expenditure under this head, which amounted in :—

1870-71 to Rs.31,993 (Actuals),
 1871-72 to Rs.44,826 (Revised Estimate),
 1872-73 to Rs.48,400 (Budget Estimate),

exclusive of the pay and travelling allowance of officers and the feed and keep of elephants employed by them, which were charged to other Budget headings.

It was consequently decided to constitute a separate agency for forest surveys, and thus the Forest Survey Branch was created by the Government of India's Resolution, No. 19, dated the 17th October, 1872. The new Survey Branch was placed under the immediate control of the Inspector-General of Forests. Captain (later Colonel) F. Bailey, R.E., at the time a Deputy Conservator in the North-Western Provinces, was entrusted with the organization of the Forest Survey Branch, and was appointed Superintendent of Forest Surveys and Working Plans. This officer displayed great energy, ability and tact in organising this new branch of the service and in bringing it into complete harmony with the Survey of India, who thereafter accepted the Forest Survey Branch work for topographical purposes. He presided over the Branch for ten years, but during the second quinquennium, when he was also entrusted with the organisation of the Forest School—of which more hereafter—the actual working fell to a great extent on Mr. W. H. Reynolds, who had been connected, as Assistant to Captain Bailey, with the new organisation from the outset.

In 1883-4 Mr. Reynolds was placed in independent charge of the Forest Survey Branch, and conducted this important business with great credit to himself and profit to the State up to the end of the century. Natives of the country were formerly not utilised in professional surveys in India, but in subordinate positions and on unimportant work. Mr. Reynolds

FOREST ADMINISTRATION PROGRESS, 1871-1900 481

proved in practice, by employing a constantly increasing proportion of fairly educated and practically and carefully trained natives on work which previously had only been entrusted to Europeans, that the native agency was sufficiently trustworthy and able to undertake the more important branches of survey work. He thereby materially reduced the cost-rates of the Forest Survey Branch without in the least impairing the accuracy and neatness of the maps turned out, which were able to bear comparison with those produced by any other agency. By this action Mr. Reynolds loyally and successfully carried out the principle of the Indian Forest Department to employ natives of the country as far as possible and to educate and train them for their work.

With the increase in experience and strength the Survey Branch consistently increased the out-turn and thereby lowered the proportion of the cost of control to that of execution, so that by 1900 it was considered that the cost-rate probably represented the minimum for which a reliable survey could be turned out in India.

The following table shows the quinquennial out-turn of the surveys completed and the total cost of the Forest Survey Branch for each period :—

PERIOD.	Square miles for period.	Total expenditure for period.	Average number of sq. miles per year.	Average expenditure per year.	Average expenditure per sq. mile.
		Rs.		Rs.	Rs.
1873-74 to 1877-78 .	1,284	3,13,069	260	62,614	241
1878-79 to 1882-83 .	1,599	2,20,605	320	44,121	138
1883-84 to 1887-88 .	2,973	3,27,694	594	65,539	110
1888-89 to 1892-93 .	6,454	5,25,661	1,291	1,05,132	81
1893-94 to 1897-98 .	10,380	8,01,241	2,076	1,60,248	77

The standard survey of the Forest Survey Branch is 4 inches to the mile, but during the latter periods the following surveys were made on a larger or smaller scale :—

	16 in. sq. miles.	2 in. sq. miles.	1 in. sq. miles.
1883-84 to 1887-88 .	—	1,396	—
1888-89 to 1892-93 .	439	10	1,750
1893-94 to 1897-98 .	816	—	2,192
Total	= 1,255	1,406	3,942

In 1873, when the Forest Survey Branch was constituted, the Survey of India was still expanding and had more work than it could accomplish, and it was at the time contemplated to expand the Forest Survey Branch so as to meet all demands for forest surveys in India. This programme was not, however, carried into effect. The requirements of the Department for reliable maps rose more rapidly than was anticipated, and though it might have been possible to arrange for this by a corresponding increase of the Forest Survey Branch, it was decided, in view of the large survey establishments already in the service of the State, for whom employment would have to be found within a few years, not to expand the Forest Survey Branch, but to utilise the services of parties of the Surveyor-General's Department for forest surveys as their services became available from time to time.

The first forest surveys executed on the scale of 4 inches to a mile by the Survey of India were those of the Thana District in the Bombay Presidency, carried out in conjunction with the survey of that district. They were begun in 1881-2. In 1882-3 the survey of the Dangs in the same Presidency was added. During the next year a Survey of India party was also employed in Burma, and work was carried out in the Rawal Pindi Division of the Punjab. Subsequently parties of the Survey of India were constantly employed on forest surveys in Bombay and Burma. In 1887-8 the Survey of India Department extended its forest survey operations to Madras and the Central Provinces, where work was being carried on by them at the close of this period.

The table opposite shows in square miles the extent of forest surveys carried out both by the Forest Survey Branch and the Survey of India Department in the various provinces till the end of 1897-8.

In 1889-90 it was decided to provide for the recruitment of the superior staff of the Forest Survey Branch through the Survey of India Department, and the Superintendent and his assistants were absorbed in the general cadre.

Year by year it became more evident that a survey branch, specially organised, controlled and handled for the kind of work required by the Forest Department, worked at a very much smaller cost-rate than a new party freshly introduced to forest surveys. As a matter of fact this is the history of the Forest Survey Branch itself. At the outset its work was expensive, even more so than that of the Survey of India.

Survey Year.	Bengal.			North-Western Provinces and Oudh.			Punjab.		Central Provinces.		Burma.		Assam.		Berar.		Madras.		Bombay.			By Survey of India Department.	By Forest Survey Branch.	Total.
	Scale.			Scale.			Scale.		Scale.		Scale.		Scale.		Scale.		Scale.		Scale.					
	4"	2"	12"	8"	4"	2"	4"	1"	16"	4"	4"	2"	4"	4"	4"	2"	4"	4"	16"	8"	4"			
1872-74	—	—	—	—	145	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	145	288	145
1875-76	—	—	—	—	288	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	288	313	288
1876-77	—	—	—	—	313	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	313	313	313
1877-78	—	—	—	—	211	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	211	327	327
1878-79	—	—	—	—	327	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	327	346	346
1879-80	—	—	3	—	318	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	318	318	318
1880-81	—	—	—	—	260	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	260	260	260
1881-82	—	—	—	—	179	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	205	205	205
1882-83	—	—	—	—	300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	301	301	301
1883-84	—	—	—	—	53	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	74	74	74
1884-85	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	264	264	264
1885-86	—	—	—	—	35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	410	410	410
1886-87	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	607	607	607
1887-88	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	903	903	903
1888-89	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	142	142	142
1889-90	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	979	979	979
1890-91	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2023	2023	2023
1891-92	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	652	652	652
1892-93	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1030	1030	1030
1893-94	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1382	1382	1382
1894-95	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1586	1586	1586
1895-96	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2270	2270	2270
1896-97	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1720	1720	1720
1897-98	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2555	2555	2555
"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1898	1898	1898
"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2460	2460	2460
"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3288	3288	3288
"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2365	2365	2365
"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1937	1937	1937
"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	670	670	670
Total	652	215	3	215	4982	205	2955	3942	1255	11471	5433	1388	613	613	1221	936	1221	102	2318	3095	226412	23318	226412	46759
	867			5403			6897		12726		6821	613	613		2157		5118		5605		22641	23318	22641	46759

* Surveys by Forest Survey Branch; other surveys by Survey of India; areas taken from a statement furnished by Surveyor-General.

Department, but as experience was gained the cost-rate diminished rapidly, and in whatever Province (Punjab, the Central Provinces or Burma) the Forest Survey Branch worked side by side with parties of the Survey of India, the cost-rate per square mile of the former was invariably much less than that at which the latter turned out their work, the difference averaging nearly 40 per cent. It thus became evident that arrangements must be made by which a certain section of the Surveyor-General's Department should be made permanently available for forest surveys, and it was decided to constitute a branch of the general Department as "Forest Surveys of India," and to organise it somewhat on the lines of the existing Forest Survey Branch, which under this plan would become absorbed in the Survey of India Department.

By 1900 this programme had only been given effect to in the provinces directly under the Government of India where the Forest Survey Branch was amalgamated with Survey of India parties employed on forest surveys; but it was contemplated to extend the scheme to the Madras and Bombay Presidencies as well. The Surveyor-General was to be in professional control, but the Inspector-General of Forests would, in consultation with Local Governments, decide what surveys should be executed, on what scale, and with what degree of detail. He would also examine and criticise the Annual Budget for the surveys executed under his directions. Mr. Reynolds was entrusted with starting the new programme and the time of his service was, for this reason, extended up to October, 1900. It would be impossible to speak too highly, as Ribbentrop, the Inspector-General, himself constantly said, of the invaluable services which Colonel Bailey from the initiating period, and subsequently Mr. Reynolds rendered to the Department in carrying through the greater bulk of the survey work of the forest areas. Mr. Reynolds, made it his life's work, and it serves as a fitting and lasting memorial of that work.

In a Resolution of the Government of India, 1894, the following subdivision of the forests was indicated: (a) Forests the preservation of which is essential on climatic grounds. (b) Forests managed chiefly for the supply of useful timber for commercial purposes and general construction. (c) Minor forests to afford a supply of wood fodder, grazing and other produce to the agriculturist and others. (d) Pasture lands or grazing grounds managed by the Forest Department. But the division is not ideal, since the one class of forest runs into the other.

CHAPTER XV

THE ORGANISATION AND EDUCATION OF THE STAFF OF THE DEPARTMENT, 1871-1900

IN a previous chapter the methods upon which the Department was first organised have been described. As has been shown, at that period no officers were available with any special training for the work to fill either the controlling or executive branches of the new service. The earlier appointments were filled by men selected from other branches of the Public Service, Army Officers and members of the Public Works Department being the most common source of supply, the individuals being often lent temporarily to supervise exploitation work in a forest area in order to provide needed timber material for the construction of some public work of importance.

With the advent of the Department a much larger number of permanent officers was required. Again the Army provided a considerable number of recruits to the new service, some of whom left a permanent mark in the annals of the Department. These men, and others, were selected primarily through having previously shown some qualifications for forest work, either being ardent sportsmen or keen naturalists. The majority of the men so selected found themselves within a short space at home in their new sphere, displaying even in this new constructive work, which was practically unknown in India or even throughout our Empire, the great administrative adaptability of the British race. Appointments were also filled by young men specially nominated to the Department, either through being connections of officials in the country or possessing influence at home. Brandis, as already detailed, quickly realised that progress could not be rapid nor the forests be properly administered in the future unless a trained staff was obtained, and by the commencement of the period here reviewed arrangements were in force by which probationers

selected at home were undergoing a course of training in French and German forests before joining their appointments in India.

As regards the Controlling Staff by 1870 the presidencies and provinces were each in charge of a Conservator of Forest, each Conservator having a varying number of officers under him who were in actual charge of the forests in their districts, the area under each of the officers being styled a "Forest Division." At the outset, as has been shown was the case with Brandis in Burma, Pearson in the Central Provinces, and so forth, the Administrative Head or Conservator had to carry out the whole of the executive work himself. With the formation of the forest division, this latter devolved upon the Divisional Officer and set free the Conservator for more purely administrative duties. It had been early recognised that the sub-division of the forest division which was to be termed the range would form the unit of the forest administration. But the appearance of the Range Officer, the head of the subordinate staff, came slowly. In the early days the executive or subordinate staff consisted of very inadequately paid, and for the most part incompetent, forest guards or "peons." Members of the classes from whom it was desired to recruit the Ranger Staff had no taste for forest life, and even when the recruitment for this staff commenced to make headway, the men obtained were totally untrained and often proved more of a hindrance than assistance to the Divisional Officer. Later on a new service termed the Provincial Service came into being.

It will be necessary to deal with the progress in development of these three Services up to the close of the century before detailing the lines upon which the forestry education of the three branches proceeded.

The Controlling Staff or Imperial Service.—With the increase of work and responsibilities which the close of the first decade of the life of the new Department brought about, it had become evident that several of the provinces were too large to remain under one Conservator, and the inevitable subdivision took place. This at first affected Conservators only. A Conservator's charge was divided into two or more "Circles," as they became known, a Conservator being appointed to the charge of each. Bombay took the lead in this direction, the Presidency being divided into three Conservatorships in 1873; Assam was separated from Bengal in 1874, each having a Conservator,

Burma (that is, Lower Burma, Upper Burma had not yet been annexed) was divided into two Circles in 1876 ; the North-West Provinces and Oudh were formed into three Circles in 1878, and Madras was separated into a Northern and Southern Circle in 1883. This sufficed for a time, but further subdivision became necessary. The Central Provinces were formed into two Circles in 1889. As a result of the annexation of Upper Burma, two new Circles were added to that Province in 1886. Madras was divided into three Circles in 1891 and Bombay into four in 1892.

The first graded list of Conservators, Deputy and Assistant Conservators under the Government of India was published in 1869, when the staff consisted of 57 officers, costing Rs.94,618 per annum.

Increased work and the growing requirements of the administration necessitated constant additions, and in 1882 the staff already consisted of 94 officers in the controlling grades, costing Rs.6,29,424 per annum. This gives an average monthly salary of Rs.558 per officer. The decrease in the average monthly rate of salary, which was much too low from the outset, was mainly due to the appointment of many junior officers, without making the necessary provision for their advancement to higher grades. The consequence was stagnation in promotion and dissatisfaction amongst a deserving body of servants of the State, who could barely hope to attain to the grade of Deputy Conservator on Rs.500 per mensem under 12 to 15 years of service.

The Government of India recognised the hardships of the case, and with the previous sanction of the Secretary of State the Department was reorganised on the 3rd September, 1882, on the scale recommended by Dr. Schlich, then Conservator of Forests and officiating Inspector-General. The number of officers was raised from 94 to 100, and the average pay was fixed at Rs.642 per mensem. The increase of the average in the Controlling Staff was caused by providing a more suitable proportion of appointments in the higher grades.

Soon after the reorganisation had taken place, it was found necessary to add three officers in Burma and three in Assam, and one for Baluchistan. These appointments again caused a fall in the average pay, from Rs.642 to Rs.628 per mensem.

There were three grades of Conservators, four grades of Deputy Conservators and three grades of Assistant Conservators.

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ORGANISATION AND EDUCATION OF THE STAFF 489

Forest Department. This arrangement largely increased the requirements made on the Forest Staff, and necessitated a considerable increase. A reorganisation was consequently decided on, and a staff of 24 officers was sanctioned by the Secretary of State. Two more appointments were subsequently added, and the staff in 1885 stood as follows : Conservators of Forests, 2; Deputy Conservators of Forests, 14; Assistant Conservators of Forests, 10: total 26.

The monthly average of pay was the same as in the Bengal Presidency, viz., Rs.628.

The reorganisation of the Bombay Controlling Staff took place in November, 1883, and was carried out on the same lines as that of the Bengal Presidency. The staff had gradually increased to 23 officers, and the average monthly pay had declined to Rs.551.

The reorganisation provided for 27 officers, with an average monthly pay of Rs.635. The staff then stood as follows : Conservators of Forests, 3; Deputy Conservators of Forests, 14; Assistant Conservators of Forests, 10: total, 27.

To this, two more appointments were subsequently added to provide for the extension of working plans, raising the total to 29.

To sum up, the Controlling Staff in the three presidencies stood as follows in 1884 :—

	Rates of Pay.		No. of Officers.
	Rs.	Rs.	
Inspector-General of Forests to the Government of India . .	1,700	to 2,000	1
Conservators of Forests . .	1,000	to 1,500	15
Deputy Conservators of Forests .	550	to 900	85
Assistant Conservators of Forests.	250	to 450	58
Special appointments . .	600	to 900	4
Total			163

Further additions were made to the staff, and in 1888 the list stood as follows :—

	Rates of Pay.		No. of Officers.
	Rs.	Rs.	
Inspector-General of Forests to the Government of India	2,000	to 2,500	1
Conservator of Forests . .	1,100	to 1,600	18
Deputy Conservators of Forests .	550	to 900	100
Assistant Conservators of Forests.	250	to 450	64
Special appointments . .	600	to 900	2
Total			185

The average pay for India had been maintained, but varied considerably in the several provinces. A reorganisation was then proposed, but was not sanctioned until February, 1891. Under this reorganisation the Imperial Service contained 196 officers on an average pay, including Conservators, of Rs.676; excluding them of Rs.607.

Under this reorganisation, the pay of the Inspector-General of Forests having previously been raised from Rs.1,700 by incremental increases to Rs.2,000 was increased to Rs.2,500, that of Conservators was also enhanced from Rs.1,000, Rs.1,250 and Rs.1,500 to Rs.1,100, Rs.1,350 and Rs.1,600.

In order that this increase in the total salaries of the Controlling Staff should not fall too heavily on the Indian Exchequer, although it may be remarked that the increased emoluments were long overdue in view of the heavy work undertaken under severe climatic conditions—but in order that the burden should not prove too great it was determined that in future there should be a decrease in the home recruitment of the Controlling Staff. Only 80 per cent of the Controlling Staff were in future to be recruited through the Cooper's Hill College (of which more hereafter), the remaining 20 per cent of the appointments being filled by the promotion of suitable men from the executive or lower staff. The selections were to be made from men who had passed through the Dehra Dun Forest School or the Poona College, and who had subsequently served in the lower grades of the Service. This was the real commencement of the Provincial Service which was to be a link between the Subordinate Executive Service and the Upper or Imperial Controlling Staff.

In 1896 further additions were made to the Controlling Staff to provide for the requirements of Burma, whose staff had not, owing to the recent conquest of Upper Burma, been fully ascertained.

Under this reorganisation the service of the Imperial Branch was increased to 211, and the average pay was maintained. The arrangement that 20 per cent of the appointments of Deputy and Assistant Conservatorships should ultimately fall to the Provincial Service was adhered to.

The sanctioned list stood as follows in 1900. It had been decided at this date that any future demands should as far as possible be met by a direct increase in the upper grades of the Provincial Service, for which an increasing number of officers would become qualified year by year :—

ORGANISATION AND EDUCATION OF THE STAFF 491

Inspector-General of Forests to the Government of India	Rates of Pay.		No. of Officers.
	Rs.	Rs.	
Inspector-General of Forests to the Government of India	2,000	to 2,500	1
Conservators of Forests	1,100	to 1,600	19
Deputy Conservators of Forests	550	to 900	122
Assistant Conservators of Forests	350	to 450	64
Special appointments	(No fixed rates)		7
Total	.	.	213

The decentralisation of the staff in 1885 did not prove an unmixed blessing, as the officers in some of the provinces were so few in number as to render promotion exceedingly slow. Thus the same state of affairs was brought about as that which Brandis had rectified by amalgamation in 1860 (p. 30). To remove this hardship and to insure a more equal flow of promotion, the services of the Punjab, the Central Provinces, Coorg, Berar and Baluchistan were amalgamated. The obligation to officer Coorg which was under the Government of India was, owing to language difficulties, subsequently transferred to Madras.

It was proposed to amalgamate in a similar manner the services of the North-Western Provinces and Oudh, Bengal and Assam, but the Local Governments were opposed to this at the time, and equality of promotion on these small lists could only be maintained by occasional inter-provincial transfers.

As detailed in Volume I, the new Department was, in the first instance, though against the wish of the Secretary of State, placed under the Secretary in the Public Works Department and in charge of the Honourable Member of that Department.

In 1871 it was made part of the business of the newly constituted Department of Revenue and Agriculture. On the abolishment of this Department in 1879 the forest business was transferred to the Home Department, but retransferred in 1886 to the Department of Revenue and Agriculture which had been reformed in 1881. Since 1871 the Forest Department has been in charge of the Honourable Member holding the portfolio of the Home Department.

The Provincial Service.—The Provincial Service was first inaugurated under the February, 1891, reorganisation, the idea being enunciated that the Imperial Staff should form a *corps élite*. It was to be recruited at home and receive the highest possible training that expert scientific staffs and European forests, the only ones in the world which had been under scientific treatment for a couple of centuries and more,

could give them. As will be subsequently shown, this idea was to receive a further impetus at a later period.

The gradual development of the Provincial Service during the period under review was as follows : Previous to 1891 what may be termed a Provincial Service had in effect existed. Even before the training scheme was adopted at home for the Controlling Staff and for some considerable period thereafter the growth of the work of the Department had necessitated the recruitment of a larger number of officers than were borne on the cadres of the Controlling Staffs of the various provinces. To circumvent this difficulty, young men of suitable character, mostly as a matter of fact Europeans, were recruited as Sub-Assistant Conservators. They joined the Service with the expectation that if they acquitted themselves well they would eventually be transferred to the Upper Controlling Staff. Many realised this hope and some of them eventually reached the highest grades and did excellent work. Some became Conservators in important Native States. But it was realised that the failures outnumbered the successes. The Secretary of State had always retained the right to recruit the probationers for the Imperial Service at home and of sanctioning any transfer to it from the lower grades. The last of such transfers were made after the annexation of Upper Burma to meet the urgent requirements of that Province. The reorganisation of 1891 put an end to such transfers, whilst at the same time inaugurating a recognised Provincial Service with well-defined and better prospects. Ribbentrop in 1899 described this new departure as follows :

“ Previous to this reorganisation we had only 47 Sub-Assistant Conservatorships on salaries ranging from Rs.175 to Rs.250 per mensem, which continued to be available for the patronage of Local Governments, and which were, as a rule, given to young men of European extraction, though their education, technical and otherwise, was by no means superior to that of the Native Rangers who had passed alongside of them through the Dehra Forest School. It was evident that under these circumstances it was hardly possible to build up a thoroughly strong Executive Service, and it was recognised that in order to effect this and to attract the best men in sufficient numbers, the whole of the appointments of the Provincial Service must become prizes of the Executive or Rangers' Service, and be obtainable only after service in the lower branches. This was the principle on which the Provincial Service was reorganised.

In the place of 47 appointments of Rs.175 to Rs.250, 86 were

ORGANISATION AND EDUCATION OF THE STAFF 493

sanctioned on Rs.250 to Rs.350, to which six have since been added, making a total of 92. In addition to this, it was decided to gradually increase the Provincial Service by the transfer to it in the course of 20 years of 20 per cent of the appointments held by the Imperial Service. The salaries of these appointments have been fixed at Rs.350 to Rs.600. During the last seven years 19 appointments have thus been transferred, leaving 24 to be similarly dealt with during the next thirteen years. By this time the first appointments will have risen into the higher grades.

When the reorganisation was first promulgated, sufficiently qualified men were not available, and young men of European extraction grasped the situation more rapidly, and came into the Service in considerable numbers. The first who came had naturally fairly rapid advancement, but as matters settle themselves down the fact must not be lost sight of that, though there will be prizes in the course of the next thirteen years up to Rs.600 per mensem, the average pay of the combined Executive and Provincial Services will amount only to Rs.134."

The Executive or Subordinate Service.—It has been already pointed out that the subordinate staff proved the most difficult to recruit, and this service was accordingly the slowest to develop, and even in 1900 was by far the most backward of the three. This factor is not surprising when it is remembered that the native of the open country held the forest or jungle in horror and detestation as the home of wild beasts and devils, and a hot-bed of malaria. These opinions had descended to him through generations of ancestors, the former invaders or conquerors of the country. Through many centuries the great jungles had been the enemy of civilised mankind in India to be destroyed and got rid of to permit the spread of cultivation, to reduce the danger of jungle malaria and to enable him to pasture his flocks in comparative safety in an open scrub. The indigenous population of the country who had been pushed back by the invading hosts into the more hilly and densely clad forest country were but semi-civilised, and although often forming the backbone of the service of Forest Guards possessed neither the education nor the attainments required for the Ranger Staff of the Department. It need scarcely prove a matter of surprise, therefore, that recruitment for this staff proved excessively difficult, and that for many years in almost every Province all the executive work had to be done by the Divisional Officer himself. The engagement of the Ranger Staff at first rested entirely in the hands of the Divisional Officers or the Conservators. There was no regular organisation

or graded list, the men being appointed as they were required, with no prospects in front of them. A gradual improvement took place with the establishment of the Dehra Dun Forest School in 1878, at which a forestry training was to be given to selected men for the Ranger's posts, but even then their prospects were very uncertain. The idea of Brandis (or was it the Government of India?) that the Divisional Officer with his hands too full of work already should be able to find time to train his subordinates himself, had persisted too long. Nor with the immense areas of the forest charges, and the impossibility of the Divisional Officer keeping his Ranger with him if he were to get any work out of him, was it ever a feasible plan.

When the reorganisation of the Subordinate Services came about, Madras and Bombay took the lead. The scheme introduced by the former unfortunately proved inadequate.

Ribbentrop describes this reorganisation :

"A general scheme for the reorganisation of the Executive and Subordinate staffs was framed in 1887, but temporarily dropped, pending the reorganisation of the Controlling Staff. When this had been finally sanctioned by the Secretary of State in 1891, the scheme brought up to date was resubmitted, but was finally sanctioned only in 1896.

The cost of the Executive and Protective Forest Services in the Bengal and Madras Presidencies was raised from Rs.8,77,422 to Rs.11,98,068, and now stands, including Bombay, as follows: *Executive Service*—Rangers, from Rs.2,49,210 to Rs.3,96,204 per annum. *Protective Service*—Deputy Rangers and Foresters, from Rs.3,06,060 to Rs.3,67,224 per annum; Guards, from Rs.7,25,928 to Rs.8,40,696 per annum.

In many parts of India the provision is already found insufficient, and in some cases it has had to be augmented, though but a few years have lapsed since the sanction was obtained. The time cannot be far distant when a general strengthening of the Rangers class will be found both advisable and profitable; and, as the Department advances in revenue and utility, which it is sure to do, the number of Rangers may probably with advantage be doubled. The pay in the Rangers' Service has been improved under the last reorganisation, the highest grade now being Rs.150 instead of Rs.125 per mensem, and a matter of even greater importance is that the various grades have been so arranged that the officers may count on a steady promotion. The greatest boon of the reorganisation, however, is that members of this Service are now, from the time they enter it, candidates for the Provincial Service, and eligible to rise to Extra-Deputy Conservators of the 1st grade on Rs.600 per mensem, whereas in former times their service was practically cut short at Rs.125.

ORGANISATION AND EDUCATION OF THE STAFF 495

In the same way Deputy Rangers who have obtained the necessary certificate in the Lower or Vernacular Class of the Forest School, can now by good service obtain entry into the Rangers' class; deserving Foresters may rise into the Deputy Rangers' class; and Guards, with sufficient education and of special merit, may become Foresters. The whole service, especially the Rangers' and Provincial Services, have been designed with a view of attracting the most suitable classes of natives of the country."

Administration and Procedure.—In previous chapters of this history some of the early difficulties of the Department have been alluded to. On the one hand they had the people against them owing to the inevitable friction which arose when customs of long standing had to be interfered with if the forest property was to be saved from utter destruction; on the other, they had to face the resentment and often actual opposition of the District Officer, who perhaps not unnaturally disliked having to make over the charge of the forest areas situated within his district to a newly-risen official. The introduction of an administrative procedure was therefore a plant of slow growth and not infrequently an extremely thorny one in its youth. Matters gradually settled down, however, and by the end of the century the controversies of the past had given place to a well-ordered and well-understood procedure. This development will be briefly glanced at.

The appointment of Inspector-General of Forests was first made in order that the Government of India might have an adviser to aid them in laying down the lines of a general forest policy for the country and to organise a department to carry out this policy and manage the forest estate. The duties of the Inspector-General were gradually extended, and by the end of the period here reviewed he acted as professional adviser to the Government of India and Local Governments, controlled the Forest School at Dehra Dun, the Forest Surveys and the Working Plans. He was empowered to write officially to the Government of India and to Local Governments and to Conservators in the several provinces on matters which involved the administrative or general policy. In the case of Madras and Bombay the Inspector-General could only correspond with the Conservators through the local secretariats in charge of forest matters. Conservators of Forests, whether in charge of a whole Province or a part (Circle) only, were regarded as the head of the Department, and were directly subordinate to the Local Government, with the exception of

Madras, where the Board of Revenue intervened ; and of Benar, Coorg and Ajmere, where the correspondence went to the Commissioners. The Conservators really controlled the forest administration of the country and wielded the greatest power, always provided they had a thorough knowledge of their profession, that the climate had left them with sufficient energy to apply it, and that they possessed the tact to secure the ear of the Local Governments to whom they were responsible. That the Department was fortunate in its Conservators the great progress made by the end of the century affords sufficient evidence. That most of the Local Governments showed perhaps an undue regard for quick and increasing financial results can scarcely be laid to the door of the Conservators. The Conservators were appointed by selection and not by seniority, and the Government of India reserved to themselves the right to make these appointments for all the provincial lists without reference to the particular Province in which a vacancy occurred. For the guidance of the Supreme Government the Local Governments forwarded an annual report on the fitness of their senior Deputy Conservators for promotion to Conservator's rank, the nominee being then sent to the Province in which the vacancy existed. Madras and Bombay appointed their Conservators in the same fashion, but the selection was only made from the officers serving in the Presidency concerned. Selection under this procedure proved of great value to the Department, since when the officers who had received a special training at home had reached some 10-12 years' seniority it became possible, as it was advisable, to promote them over the heads of untrained more senior Deputy Conservators and thus ensure the Provinces and Circles being placed under fully trained officers at an earlier date than would have been possible had not the Government of India retained a free hand in this matter. Before the end of the century, however, this early rise to Conservators' rank had almost disappeared, as the ranks below the Conservator grades were staffed by fully trained men ; selection by seniority then became the practice, if not the rule, with a consequent stagnation in promotion. Next to the post of Inspector-General that of Conservator and Director of the Forest School was the most important and most sought after.

As has been mentioned, the Circle was divided into a number of divisions. These latter were usually under the charge of an Imperial Service Officer, Deputy or Assistant. When a

Province was short-handed a member of the Provincial Staff would be placed in charge of one of the smaller or less important Divisions. The Divisions were divided into Ranges, each in charge of a Ranger or Deputy Ranger. The Ranger was the executive officer in the tract of forests of his charge and is (or should be) the right-hand man of the Divisional Officer to whom he is directly responsible for every detail in the protection and working of the forest. It is for this reason that the latter was so keenly interested in the Ranger receiving a good technical education. The Ranger in the larger divisions was usually assisted by one or more Foresters. For measures of protection and inspection of forest operations generally the Range was subdivided into beats, each of which was in charge of a Forest Guard.

It would be impossible here to discuss the size of the forest divisions or their subdivision. At the end of the century many of them were far too large to enable the officer in charge to make a commencement at real scientific conservation. Roughly, they varied from 120 or so square miles to 1500 or 2000 square miles. And there were some considerably in excess of the latter figure.

In 1900 the staff stood as follows :

Imperial Service.—Inspector-General, 1 ; Conservators, 19 ; Deputy Conservators, 117 ; Assistant Conservators, 63.

Provincial Service.—Extra-Deputy Conservators, 5 ; Extra-Assistant Conservators, 107.

Executive and Subordinate Service.—Rangers, 437 ; Deputy Rangers and Foresters, 1226 ; Forest Guards, 8533, or a grand total of 10,508 as the forest personnel.

The position which the Divisional Forest Officer occupied *vis-à-vis* the District Officer (Collector or Deputy Commissioner) varied in different provinces and presidencies, and appears to have had some connection with the degree in which Forestry Conservation was welcomed or otherwise by the officials in the part of India in question.

As an outcome of Brandis' scheme for the reorganisation of the Bombay Forest Staff in 1870, the Forest Officer was styled "District Forest Officer," and was appointed to the Collectorate or District and was entirely subordinate to the Collector, through whom he corresponded with the Conservator. In Madras a similar system was in force, but was subsequently modified and not for the better. The Conservator became an inspecting officer only with powers of finance and establish-

ments. In 1877 the Chief Commissioner of the Central Provinces modified this system, the Conservator and his Divisional Officer remaining in independent charge of all Reserved Forests, whilst the District Forest Officer was subordinate to the Deputy Commissioner regarding all the Unreserved Forests. In 1880 the Government of the North-West Provinces and Oudh decreed that the District Forest Officer was made subordinate to the Collector, his correspondence being arranged in two classes; that referring to accounts, establishments and so forth went to the Conservator direct, whilst that on administration and other matters went to the Conservator through the Collector. A similar arrangement was introduced into Burma in 1880 and into Assam in 1882. In the Punjab the Divisional Officer was nominally subordinate to the Deputy Commissioner, and the position was rather similar to that in Bengal. This matter remained in abeyance in Bengal for some years, and at length a much more elastic scheme was in force than those dealt with above. In practice, during the last decade of the century, as the writer can vouch from personal experience, the Divisional Forest Officer had a free hand to correspond direct with his Conservator and in the entire administration of his forests. If any question arose which affected the population of the district he consulted with the Collector on the matter, and was always prepared to forward any papers on forest matters the Collector desired to see. Drafts of new or revised Working Plans of course went to the Collector for his opinions. Speaking from the experience gained in working three of the largest, most understaffed and heaviest of the Divisions of the Province the writer can express the opinion that the Bengal plan worked admirably. Under which method the best results have been attained must be left to the judgment of the reader, having regard to the varying progress made in the different provinces.

THE PROGRESS OF FORESTRY EDUCATION

In the previous Part the inauguration by Brandis of the systematic training at home of probationers for the Controlling or Imperial Service has been dealt with in detail. It is proposed here to describe the changes which took place in the methods of according this training, and to discuss the education which was subsequently provided for both the lower executive and provincial staffs.

The Training of Probationers for the Imperial Service.—It will be remembered that with the outbreak of the Franco-Prussian War it had been necessary to transfer the probationers from the Nancy Forest School, which was immediately closed, to Scotland, where their training was continued under the supervision of Cleghorn. The training of those who were in Germany was continued there, and the probationers recruited up to the year 1875 were sent to that country. Difficulties, however, arose in connection with the training in Germany, which resulted in the abandonment of that country as a training ground in 1875. For the next decade the probationers for the Indian Service were trained at Nancy only. The India Office was haunted by the fear that the difficulties which had necessitated the transference from Germany might make their appearance in France, and there were those who insisted that the men should be trained in their own country; that their training would prove more efficient since carried on in their own language—an argument which had a strong element of truth in it.

Whilst the training continued in France, the officer placed in charge of the probationers by the India Office was Colonel Pearson, who had retired from India. The debt which the Service owes to Colonel Pearson, both for his admirable work as one of the pioneers of the new Department in India, and subsequently, for his untiring care of the probationers who were to go out and carry on the work, is incalculable. Colonel Pearson is still with us, and has become the much-revered Father of the Service to which he has given the whole of a remarkably long life and in which he is followed by a son who has already won distinction in the Service.

Of the officers trained under the continental regime Ribbentrop (*Forestry in British India*) wrote: "The officers obtained under this system have, with few exceptions, which must always occur, greatly helped in the introduction of a sound forestry system into the Empire, and our present class of Conservators, permanent and officiating, is greatly composed of them. They are good foresters and good administrators. Amongst so many in the first flight it is a difficult task to judge the leaders, but I consider that Messrs. Hill, Gamble, Wroughton and Dansey, amongst those who came to us from France, and Messrs. Popert, Eardley Wilmot, Oliver, Nisbet and Carter, who learned forestry in Germany, deserve this distinction. The officers who joined during the last years of

recruitment through Nancy, though death and retirement have greatly reduced their number, still present a rich field of selection for the class of Conservators. . . . Of the 95 officers recruited between 1869 and 1886, 45, or more than half, have already died or left the Service."

Owing to the difficulties which had arisen in the matter of training the probationers on the Continent the question was mooted not, as has been already shown, for the first time, of training the probationers in England. The Government of India were strongly opposed to any change, pointing out the valuable results which had been attained by the work of their continental-trained officers. There existed at the time, under the auspices of the India Office, a College at Cooper's Hill, in England, at which the officers for the Public Works and Telegraph Services of the Indian Government received their training. This college was, in fact, a replica of the old Haileybury College of the East India Company's day. It had proved a very expensive place to keep up, and one at least of the reasons of the Secretary of State, it may be admitted that it was not the only one, for wishing to transfer the forest probationers to this institution was the hope that the expenses of the College might to some extent be covered, which had not been the case so far in spite of the very heavy fees charged at this Institution.

After three years of discussion the Indian Government agreed to the transference of the probationers to Cooper's Hill, and the first set of men joined the College in 1885. The chief problem in connection with this momentous step was the question of finding a professor to deliver the lecture courses in forestry. The choice fell on Dr Schlich, and the consensus of opinion has since been that no one in the Service at the time and no one else in the British Empire could have achieved the immediate success which attended his labours in this new field. As Ribbentrop says: "The school was successful from the outset, and even the first year's outturn gave us as good a set of officers as we could wish. The success from the beginning is entirely due to Dr. Schlich." Those of us who received our training at the College under him know far better than Ribbentrop can have known the methods by which that success was attained and the debt we owe to the teaching, tact and kindness of this wise man and great Forester.

During the first few years the course of study extended over twenty-six months and was carried out on much the same lines

ORGANISATION AND EDUCATION OF THE STAFF 501

as given in the continental schools. Twenty-two months were spent at the College and four months under supervision in selected British and German forests. The visits to German forests were undertaken with the assistance of Brandis.

Schlich was not, however, content with the period available for the training, rightly contending that it was too short.

In 1888 he submitted, for the consideration of the Secretary of State and Government of India, proposals for extending the course. His proposals were :

- (1) To extend the course to a period of three years.
- (2) To appoint an Assistant Professor of Forestry.
- (3) To relieve the present Professor of the duty of accompanying the students on the Continent, so that his services might be available at the College for lecturing during all the six terms of the two years, instead of four terms as had been the case till then.

Schlich's proposals were accepted, and the prospectus notifying the appointments for probationership issued early in 1890 stated that qualifying candidates would have to remain at Cooper's Hill for three years instead of two. This abrupt announcement of the change, issued with a few months' notice only, caused some comment and complaints, which, however, passed unnoticed by the public. For the same reasons which prevented the Forest School at Cooper's Hill ever developing into a National School of Forestry, for these were the hopes entertained when it was founded, enabled the really necessary step of lengthening the period of study of the probationers to be taken literally at a moment's notice without raising a storm. The public knew nothing, and cared nothing, about Forestry, and the landed proprietors of that day (the Colonial Office had not commenced the conservation of the forests in the Dependencies under its charge), with a very few exceptions, were sceptical as to its possibilities in this country. Schlich could have made of Cooper's Hill the finest Forestry School in the world had he received the backing in Britain which he worked so assiduously to obtain. It was not forthcoming, and Cooper's Hill remained a purely Indian College. The writer was one of the first of the three-year probationers at Cooper's Hill, and the late Mr. W. R. Fisher, who had been Director of the Dehra Dun Forest School, joined that year as Assistant Professor.

For the selection of the probationers a competitive examination was held annually by the Civil Service Commissioners, those qualifying for the posts proceeding to Cooper's Hill in the following September. The examination for some years consisted of English and mathematics, natural science subjects and French or German. The subjects were in groups, and a candidate to be successful had to qualify in each group. For the period it was a stiff examination, since several of the subjects, such, e.g. as botany and geology, were not taught at the Public Schools. But in spite of this it was an eminently suitable examination for a future Forest Officer. The Public Schools were naturally opposed to this examination, since it almost necessitated a boy, desirous of sitting for it, leaving his school for a crammer in order to get up some of the subjects. Before the end of the period, in fact in 1891, the examination was altered to one very much on the lines of that for Sandhurst. This change was made in spite of the strongest opposition from Schlich, Ribbentrop and Hill. The new method proved a failure, as a candidate could join Cooper's Hill with no knowledge or liking for science, and soon discover that on the threshold of life he had mistaken his profession. A case in point occurred whilst the writer was at Cooper's Hill. It is worth mentioning. One of the newly-joined probationers passed the examination mainly in classics. At the end of the first year's work he was bottom of his year. The age of the Indian Civil Service had been raised that year, and competition was small. He obtained permission to sit for the examination and passed into that Service! In the prospectus for 1900 botany was added to the subjects included in the examination, and high marks were given for it. But it would have been better if the choice of the Natural Science subjects had been left to the candidate, or that they had been made compulsory as in the former examination. On this botany and forestry controversy Brandis wrote in 1901: "Ribbentrop does not claim to be a botanist, nor does Dr. Schlich, nor does Mr. H. C. Hill, the present Inspector-General of Forests. It is necessary to mention this because in England, also amongst scientific men, the opinion prevails that forestry is a branch of botany, and that a Forester who is not a botanist cannot claim to be a scientific man. Dr. Schlich's great merit while holding the appointment of Inspector-General in India was to organise that branch of forestry which deals with the plans regulating the working of the forests, a business which is based more on mathematics than on botany. Mr. Ribbentrop's

great achievement has been to study and to correctly appreciate the peculiar sylvicultural requirements of the great variety of trees and bamboos with which the Forester has to deal in India. . . . These are great results, which, provided no retrograde measures are adopted, will bear fruit in steadily increasing the productive powers and capital value of the forests, and will contribute largely to the welfare of the millions inhabiting the British Indian Empire."

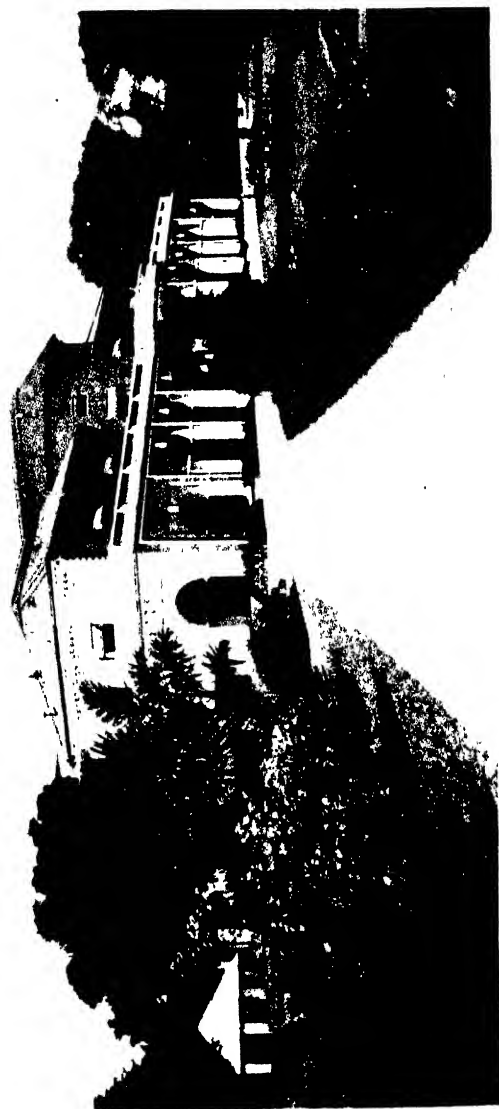
The practical courses on the Continent had been rearranged, the probationers being sent to Germany and attached for several months to a selected Forest Division, the tour at the end of this period being greatly curtailed. The writer, to some extent, concurs with Ribbentrop in his expressed approval of this arrangement. He wrote :

" There can be no doubt that this is a great improvement. The students now learn detailed practical work, in a circumscribed area it is true, and will be better able to understand, to profit by and to retain the impressions of their subsequent Continental tour, which even under the best guidance must unquestionably be fleeting to a practically less trained understanding."

The trouble, however, of attaching men in this fashion to foreign Forest Officers always was, and is at the present day, our ignorance as a race of continental languages. To profit during the whole period of such a residence with a foreign Forest Officer entails a perfect colloquial knowledge of the language, and, as important, a perfect comprehension of the foreigner when he is speaking. How many young men leave school with such a knowledge in this country? A linguistic facility of this nature is only usually attainable by a residence in the foreign country. The writer has compared notes with many of his confrères so trained; much was learnt, but much of valuable importance was lost whilst learning to attain a colloquial proficiency. A practical course of several months spent at and near one centre on the Continent is probably the soundest method of practical instruction, but it must be under the personal supervision of a British instructor, if full advantage is to be taken of the opportunity.

Between 1866 and 1899, 207 professionally trained men were sent out from England to join the Forest Service; 112 of these were trained at Cooper's Hill; 152 out of the 207 were still in the Service in 1899.

The Lower Executive and Provincial Services.—It has already been shown (p. 76) that as early as 1869 Brandis recognised that it would not merely be necessary to train the Upper Controlling Staff, but that some steps would have to be taken to provide some technical education in forestry for the lower grades which were staffed by natives of India. A first beginning in this sense was made by placing selected natives under officers specially qualified to impart such instruction. A few good men were obtained by this means, but the number was quite inadequate to the needs of the rapidly expanding Department. In order to cope with the increasing demands, it was next decided to apprentice a number of selected young men to Forest Divisions for a year or two in the provinces in which they were to thereafter serve, and then if they proved suitable to send them to the Engineering College at Rurki, or other engineering colleges in the country, for theoretical instruction. This second attempt proved no more successful than the other. The hard-pressed Divisional Officer used the men attached to his division to assist him so far as they were capable in his heavy work. But he had no leisure to impart to them any instruction in the theory of forestry. They learnt something of the practical work in connection with managing a Forest Division, and a little office work. But the ordinary staff did that equally well. When the apprentices went on to Rurki they received instruction in road-making, building and drawing, but no forestry *qua* forestry. It was recognised, both by the Conservator and Divisional Officer, that one way or another it was essential that the Ranger Staff should be given a training in forestry, and in 1873 Schlich proposed that courses in forestry should be added to the training given at Rurki. This suggestion was not adopted. In the interim the Forest Survey Branch, under Captain (later Colonel) Bailey, R.E., had been established at Dehra Dun, and young Forest Officers had from time to time been deputed there to receive instruction in surveying. Brandis took advantage of this to advocate the establishment of a Forest School at Dehra, which afforded special advantages as a centre for such a school. Dehra is situated on a plateau at an elevation of 2000 feet, midway between the Himalaya to the north and the Siwalik Hills to the south. The plateau and Siwaliks contain forests of sâl and other species, whilst the mountains to the north contain deodar, oak, pine, fir and spruce forests. In many respects it was an ideal situation for the purpose in view. Brandis commenced by laying the



THE IMPERIAL FOREST SCHOOL, DEHRA DUN, INDIA. THE FIRST FORESTRY SCHOOL TO BE
INAUGURATED IN THE BRITISH EMPIRE.
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foundations of a forestry museum and library at this place. It having become evident that the Rurki training was a failure, several Conservators, of whom Mr. B. H. Baden-Powell, I.C.S., was a very influential member of the Department in which he spent so much of his service, addressed their respective Governments on the subject of the inefficiency of the methods of training in force. Mr. Baden-Powell wrote that the apprentices from Rurki were merely turned out as overseers and draftsmen, and were not Foresters. He advocated the establishment of a Forest School, and pointed out that in Captain Bailey and his Survey Staff at Dehra a nucleus of such a school already existed, whilst there were forests in the vicinity which would serve as a centre for the practical part of the courses.

This suggestion was carried out and the Forest School—the first Forest School in the British Empire—was inaugurated in 1878, the forests of the plateau and Siwaliks between the Ganges and Jumna (the Dehra Dun Division) and those of the neighbouring hill division known as the Chakrata Division being set aside as the school training forests and formed into a separate Circle under the control of the head of the school who was known as the Director. It was intended from the outset that these forests should be treated under a regular system of management based on European experience and lines, and this intention has been steadily kept in view ever since. Captain Bailey was appointed the first Director of the school, and the choice was as happy as was that of Schlich later to Cooper's Hill. Bailey organised the new school on sound lines and for many years it fulfilled, and even surpassed, the expectations formed of it. At the period of its formation the school was under the North-West Government, in whose Province it was situated; but permission was accorded to appoint a Board of Inspection, consisting of the Inspector-General of Forests, Schlich, at the time Conservator of Bengal, and Mr. J. Sykes Gamble, at the time Personal Assistant to the Inspector-General. The staff of the School Circle was also strengthened by the transfer of Mr. Smythies and Mr. W. R. Fisher. For the first few years there was no special staff of instructors, but in April, 1881, the first beginnings of a special staff drawn from the Department was made, the first course of systematical theoretical instruction being commenced on July 1st of that year. Since that time permanent instructors (from the Controlling Staff) have been attached to the school to deliver

these courses and to accompany the students on the practical work. The theoretical instruction was conducted in the school between July and October ; seven months (the cold and hot weather months) were spent in the plains and hill forests engaged on practical courses, including a first-class course in surveying and plane table work, the month of June being the vacation. The instruction covered a period of two years.

Two separate sets of courses were given in the school—one in English for Rangers and the other in the vernacular for Foresters. When Burma began to require trained Foresters a separate vernacular school was established towards the close of the century in that Province, since the average Burman knew no Hindustani. The question of establishing such a school in Madras was being discussed, but had not been established. The chief trouble which arose in connection with the Ranger's class was the often very inadequate knowledge of English possessed by the students attending. This was by no means always the fault of the Authorities of the Forest School at this period in India. Conservators who deputed selected men were chiefly responsible for this state of affairs. The men were supposed to be examined by the Conservator or one of his officers before being deputed, but considerable laxity was shown in this respect.

Under a Resolution, dated 3rd June, 1884, the Government of India took over the management of the school from the North-West Government, it being made an Imperial Institution, and the Inspector-General was charged with its supervision.

The next step in the progress of the school was taken by Mr. H. C. Hill, C.I.E., who was officiating for Ribbentrop as Inspector-General. In 1890 Hill proposed and obtained sanction to the Constitution of a Board of Control for the school, a step which was of incalculable benefit and responsible for the school's future marked development. This Board consisted of the Inspector-General, the Director and three Conservators, with the Assistant Inspector-General as Secretary. The Board assembled at Dehra each year. Its duties were as follows :

- (1) To arrange for the conduct of examinations.
- (2) To decide on all matters connected with the curriculum of studies at the school.
- (3) To advise regarding the prospectus of the school and qualifications for admission.

- (4) To decide the relative number of marks to be given for the different subjects—the forms of certificates, the minimum marks for Pass and Honours Certificates and similar matters. The Board recorded its findings on all these matters in Resolutions which were made public when advisable.

The possibility of extending the school so as to afford a training-ground for officers of the Imperial Service was mooted for the first time and discussed during the period under review. No action was taken on the suggestion, it being considered that the school fully fulfilled the purposes of its inauguration in training the officers required to fill the executive posts and subordinate ones in the Service. It was also considered undesirable that the officers of the Imperial Service should be trained at the same Institution as their subordinates. This question was to come up again in the future at intervals, and the developments will be dealt with in succeeding parts of this history.

When the school was first established it was intended to have a special course for the education to direct appointment of the Sub-Assistant, later designated Extra-Assistant Conservator class. This course had not been established at the close of the century. It came later—Ribbentrop wrote of it in 1900: "It is not required under the present policy of Government, according to which such appointments are to be made from the ranks of Rangers. However, this principle has not always been adhered to in practice, and as the only real excuse for direct appointment can only be found in a higher standard of education, the subject has now been allowed to drop entirely."

The school turned out Rangers for all the provinces under the Government of India, as also for Madras. Bombay educated their own men at the Poona Engineering College. By 1900 some 360 Rangers' certificates had been issued, and about 112 certificates for the vernacular class.

The Directorship of the school became vacant in 1890, and Hill proposed Gamble as the next Director. Mr. Gamble (subsequently C.I.E., F.R.S.) possessed special qualities for the post, as Ribbentrop wrote of him in this connection later: "In Mr. Gamble we had the scientist, the practical Forester, and the administrator, excellent and indefatigable in all." Gamble had a world-wide reputation as a botanist. The

building adapted for the school was for the time excellent, and before the close of the period a commodious block of residential quarters was built in the compound. Under Gamble's regime, which extended into the twentieth century, fine museum collections were built up, the necessary instruments and equipment were purchased, a laboratory was established, as also a resin distillery and an apparatus for the extraction of tannin. He was also instrumental in establishing a most instructive arboretum, adjoining the school, over which he expended a great deal of trouble and care. By the end of the nineteenth century the school was, under Gamble's fostering care, in a high state of efficiency.

It will be apparent, therefore, that no pains had been spared by Government in the development of the School, either in money or in procuring the best staff possible, consisting of picked men chosen from the Upper Controlling Staff as a whole.

How was this great opportunity taken advantage of by the natives of the country to whom these advantages were offered? It may be admitted at once that the school turned out a considerable proportion of good men who proved most useful to Divisional Officers. They showed themselves efficient Range Officers, and some turned out good silviculturists, one at least, Babu Upendra Nath Kanjilal Bahadur, a good botanist; whilst a few proved capable of assisting in the collection of data for the preparation of working plans. This was all that was demanded of them. But the real difficulty in connection with the Ranger class, as expressed by Brandis in 1901, was "that the men who enter the Dehra Dun Forest School belong to a lower social stratum than is desirable. And this," continued Brandis, "will continue until means are found to give Forest Rangers reasonable prospects of promotion." This latter was probably the real difficulty, or one of them. The Ranger had been started by Brandis himself on a low scale of pay. It was inevitable in the early days. But that scale was allowed to persist for far too long. But this was not the only cause. The main cause lay with the natives themselves. Youngsters of better class did not care for a forest life. It was too strenuous and lonely for them. They preferred the minor clerkships in offices and the leisured ease which accompanied such posts. Government from the beginning had opened the Department to natives of India. Brandis was ever an ardent advocate of their employment. He did not see how the



A FOREST SCENE, KONGMUN, IST. SARU, NEW HESMAVA. THIS PHOTOGRAPH ILLUSTRATES THE
TYPE OF DECIDUOUS FOREST VISITED BY THE PHRAE AND SCHOOL STUDENTS ON THEIR
TRAVELING COLLECTS.

P. 22, 1934, p. 22, 1934

ORGANISATION AND EDUCATION OF THE STAFF 509

expanding Department, if it was ever to bear a remote resemblance in the amount of staff per acre or square mile in continental forests under scientific management, could ever be financially staffed unless a very considerable proportion of that staff in all grades was composed of natives of India who could be paid smaller salaries than the European. The opening was there and had been so from the start, but to the close of the century it had not been taken advantage of. With certain notable exceptions amongst Indians, who proved an honour both to their Department and their country, the work of the Department and the progress made in the development and protection of the forests was done by and due to the British officers.

CHAPTER XVI

THE PROGRESS MADE IN METHODS OF EXPLOITATION AND IN THE CONSTRUCTION OF COMMUNICATIONS AND BUILDINGS, 1871-1900

THE early methods of exploiting the forests of the country and the crude and wasteful ways in which the trees were felled and converted into logs or other material, such as rough planks, etc., have been described in previous chapters of this history. Where roads or slides had to be utilised for transport, their construction was of the rudest form, the high percentage of waste being treated as one of the inevitable outcomes of this class of work. The progress made in these directions up to the close of the century will be treated in the present chapter.

EXPLOITATION

Some considerable progress was made during the period in the methods of exploitation of the forests, but the species of timber trees utilised still remained for the most part the same as had been employed throughout the century. It is a curious fact, and rather indicative of the somewhat narrow groove into which the Department had fallen, that in spite of the very large number of first-class woods existing in the forests of India no departure of any magnitude had been made in placing on the market timbers up to then unused. It is true that timber markets and merchants are very conservative, and that the opposition of vested interests was, especially in the London markets, of a formidable nature. But the fact remains that it was not until a few years after the dawn of the twentieth century that any noteworthy departure from old well-ingrained methods was made.

Locally in India some of the less known species were utilised to a varying degree, but for the most part the timber trade would only buy the timber of teak, deodar, sâl (*Shorea robusta*),

sissu (*Dalbergia Sissoo*), blackwood (*Dalbergia latifolia*), khair or cutch (*Acacia Catechu*), sandal (*Santalum album*), babul or kikar (*Acacia arabica*), tun (*Cedrela Toona*) and the red sanders (*Pterocarpus santalinus*), the particular species utilised depending upon its distribution in the country.

As has been previously shown in this history, a trade existed for some species long before the advent of the Forest Department, but with the exception of teak, blackwood and sandalwood it was almost a purely local one.

The increase in population, trade and wealth which followed the peaceful orderliness of British rule resulted in a large demand for timber, and this was again greatly increased by the requirements of the public services and the railways. We have seen that in the early days of our occupation many forests were cut out and ruined, or disappeared entirely. Then followed the period of leasing forests and allowing them to be worked by private enterprise, a plan which failed both in Madras, Burma and the Central Provinces in the case of teak, in the accessible sal forests of the North-Western Provinces and in the Himalayan forests with deodar. Areas of forest of enormous value were cut out by timber traders, who cared nothing for the future of the forest, whilst the Government did not receive an adequate value for the produce extracted. Instances of this nature had been plentiful in the history of many forests in Europe, but India failed to profit by these examples, and for many years Government authorities pinned their faith to the ruinous method of leasing out forests to capitalists in the vain hope that the latter would so work the areas as to ensure a future crop of young trees taking the place of the mature, and often immature, ones felled. The hope proved as elusive in India as it has elsewhere in the world. The method meant, and will always mean, reckless waste and inevitable ruin.

The establishment of the Forest Department gradually brought this wasteful system of exploitation to an end. As has been shown (I, p. 383), in spite of the strongest opposition from Brandis it persisted in Lower Burma longer than elsewhere, but it was brought to an abrupt termination in all save a few unimportant areas in Tenasserim in 1873, when the leases were cancelled owing to serious malpractices on the part of the lessees or their sub-contractors. After the conquest of Upper Burma (*vide* p. 453) very extensive forests came into the possession of the British Government. These under King

Theebaw had been leased to powerful timber firms at Rangoon under the vaguest terms. Consequently great difficulties were encountered in dealing with the question of their future management. No conditions had been laid down on the subject of the method of exploiting the forests, the lessees being only liable for the payment of a lump sum per annum, without reference to the amount of timber or other produce taken out. This method, as had been the case in Tenasserim, meant the inevitable ultimate ruin of the forests. Perhaps Ribbentrop's greatest service to India was the settlement he obtained, as Inspector-General, of this grave question. He had to act in the face of the most strenuous and powerful opposition, opposition strong enough to carry the question to the authorities at home. In 1886, after the conquest of the country, Ribbentrop induced the Government to claim the right of interference, and after a protracted struggle in which he showed both tact and determination an amicable settlement was arrived at, under which no trees could be cut which had not been previously selected and girdled by the Department. It may be added that in 1900 the area of the Burma Forests was: Lower Burma, 7679 square miles, Upper Burma, 7988 square miles. The surplus realised from these forests in 1899 was Rs.59,24,000, corresponding to 13d. per acre. This was much above that produced by the rest of the forests of the Indian Empire, but much below continental forests, which produced from 5s. (Prussia) to 20s. (Saxony) per acre.

Ribbentrop claims in his *Forestry in British India* that efforts had been made to introduce some of the other timbers of the Indian forests on to the home and other markets during the period here reviewed. His remarks on this subject are given below. It may be admitted that efforts were made, but in view of the totally different methods by which this matter was approached in the twentieth century, it becomes evident that those employed in the preceding one were obsolete and had little chance of success. Ribbentrop, however, accurately summarised the position as it was at the period of his retirement. He wrote :

" It is self-evident that the removal of an increased number of species represented in the *peuplement* of our forests must not merely benefit silviculture in the highest degree, but at the same time greatly facilitate the exploitation of the forests. It would appear easy to introduce many of the valuable and handsome woods to be found in our Indian forests into the general market ; but this

is by no means the case, and in spite of the continuous efforts which have been, and are being, made to introduce timbers of other kinds, success in this respect is but slow. Locally, no doubt, we have succeeded in bringing many previously unused woods into use, but a really widespread demand we have as yet established for but few new species. The most important of these are the iron wood (*Xylia dolabriformis*) and the Andaman padouk (*Pterocarpus dalbergioides*). As regards the former, I remember well the opposition by which we were met, when proposing that this wood should be used for the sleepers of the Burma railways. Success was not achieved till the Forest Department established the first small steam saw-mill in the vicinity of the forests and near the railway line, which enabled them to supply the sleepers at the lowest possible rate. From that time the demand for this wood grew, and it has now become one of the more important items in our Forest revenue. The forest Department transferred their mills and contracts to private parties as soon as the position of the timber was insured in public favour, realising as their share the value of the wood in the rough.

At present there are numerous private saw-mills in the Burma Forests. They are chiefly occupied with the conversion of pynkado, but are of the greatest assistance to the Forest Department in bringing other woods to notice in the local markets."

As has been already shown, this question of making use of other timber trees for sleepers had early occupied the attention of the Department. In 1876 a large number of sleepers of a variety of timbers were cut and placed on the railways with the object of testing their durability. But the Railway Authorities were very conservative in this respect and but little progress was made. Ribbentrop continues:—

"The trade in the Andaman padouk has had a curious history. The wood was brought to notice through the Tenasserim padouk, and when the trade in it had been fairly established it was nearly wrecked through the influence of the same wood. As far back as 1875 the Madras Gun-Carriage Factory was annually supplied from Tenasserim with padouk for gun-wheels and gun-carriages at a very high and remunerative price. This attracted attention to the extensive padouk forests in the Andamans, and taking advantage of various exhibitions we advertised the wood largely, and, beginning on a small scale, soon established a remunerative export trade. When this had grown to considerable dimensions and the demand showed no falling off, some private firms in Burma began to export Burma padouk on a large scale, and lost heavily over their venture. Unfortunately some of our consignments from the Andamans, sent on a rising market, were not so well selected as those by which we had established the trade, and padouk wood generally lost credit with consumers and fell in price from 4s. 6d. and 4s. 9d. to 2s. 6d.

and 3s. per foot. Then the Government of India did the right thing. They weeded out their stock, sold all inferior coloured and doubtful timber for what it would fetch, and restricted the exportation to the best and highest coloured squares. The consequence was that the timber not merely regained its position in the market, but that enquiries at 6s. 6d. a foot cannot be met in full. The timber of the Burmese padouk has all of the excellent qualities of the Andaman padouk, but lacks the brilliant colouring, which gives to the latter its exceptional value. In the Andamans we have the highly coloured as well as brown padouk. In structure the wood seems identical, but still it is remarkable that wood so materially differing in colour, specific weight and market value should be the produce of the same species grown under similar conditions.

India possesses many exceptionally handsome woods, well adapted for furniture or veneer, which need only be brought into fashion, and timbers specially suitable for carriage-building or other industries; but the efforts which the Forest Department are in a position to make to bring them to public notice are few. Mr. Gamble's excellent *Manual of Indian Timbers* gives a considerable amount of information as regards the technical qualities of our timbers, and ever since the Paris Exhibition of 1878 we have supplied numerous collections of hand pieces to various museums, exhibitions, institutions and private parties; but it is difficult to awaken a public interest by these means only, and unless and until woods are shown in the shape of manufactured articles, it is not likely that they will get into fashion. To do this on a large scale the Forest Department has neither the time nor the funds, and must depend to a great extent on private enterprise. To encourage such enterprise as far as possible has always been the aim of the Department, and this policy must continue, though the success achieved thus far has, as regards exports at least, not, as a rule, been very encouraging.

The question of impregnation of the less durable of the Himalayan conifers and other woods otherwise suitable for sleepers has on several occasions been under consideration; but as yet no practical results have been achieved, chiefly, no doubt, because the natural more durable species have as yet sufficed to meet the demand, at a price which makes it doubtful whether impregnated material could be supplied at a proportionately lower cost. However, as the demand increases our extensive pine forests may be called upon to yield their share, and it is one of the important duties of the Department to facilitate and encourage any enterprise in this direction."

Ribbentrop might have added that one of the causes of the failure to obtain good results from creosoting these species was due to the fact that the creosote imported from England did not retain its qualities in the Indian climate.



CONVERTING SÁU TO S INTO STEEPERS WITH THE CROSS-CUT SAW IN THE SINGHI M FOREST IN
CHOUA NAGIER MAY, 1867

He makes no mention of the fine forestry exhibit sent to the Paris Exhibition of 1900 which he was chiefly instrumental in having collected and arranged. But this had no better fortune than previous ones, from a commercial point of view.

But if Ribbentrop did not witness the beginnings of a real exploitation of the forests for more than a few individual species, it was his privilege and pleasure to see the gradual introduction of well-regulated measures under which these well-known valuable species were exploited under the provisions of working plans or plans of operation; the continuity of supply thus being assured whilst the forests themselves made slow progress towards a state of normality. This in itself epitomises the value of the work of the Department during the period between 1870 and the close of the century. The old methods, disclosed in detail in Volume I, by which the magnificent teak forests of Tenasserim, Malabar, parts of Bombay and the Central Provinces and the sâl forests in the North-West Provinces were wastefully exploited and ruined, were a thing of the past. Ribbentrop mentions that when he was first posted to the Punjab "the timber in the Himalaya was tumbled down the hill-sides anyhow, and what escaped this rough usage was thrown into the hill streams and left to find its way to the plains unaided. The destruction and loss under this system was of course excessive." At the time of Ribbentrop's arrival in the Punjab these methods had been in force, as has been already shown, for twenty years and more. Long before the end of the century the Department had put an end to this waste by the construction of proper slides, sledge-ways and sleeper chutes, whilst the beds of the hill streams were improved for floating purposes by blasting works.

Generally speaking, the arrangements, apart from those already described, for exploiting the forests as regards the larger produce were as follows :

Timbers of the more valuable species were worked out by contractors under the direct supervision of the Forest Officers and was sold after arrival at depots. The Department also undertook the preparation of sleepers sawn in the forests and exported to the markets.

The key-note underlying the work was the accepted essential that the Department should select the trees to be felled, this selection being based on the silvicultural requirements of the several forests, and that the extraction of the material after

felling should also be undertaken under the direct supervision of the Department. These principles once accepted and efficiently introduced enabled the Department to grapple with the giant task of gradually restoring ruined forests to some degree of normality. The progress was inevitably slow, the rate of growth of the various species in itself serving as a limiting factor to the Forest Officer's work. But in India there was a second factor which necessarily delayed any possibility of a rapid progress, and this the deplorable condition of most of the forest areas when they first came under the management of the newly organised Department. The detailed description of the failure in the administration of the forests during the first sixty years of the century, already portrayed, sufficiently explains this point.

Apart from the timber required to supply the markets, considerable amounts of both timber and fuel had to be provided for local demands. The increasing difficulties encompassing this business, owing to the wasteful destruction of accessible forests, have been repeatedly dealt with in this history. Numerous systems were introduced, varying from province to province and often from district to district, with the object of regulating the extraction of this produce and its transit. The most usual method in force was the issue of permits under which the purchasers extracted the produce.

The methods introduced and consistently worked up to during the period, although the progress made in the different provinces for a variety of reasons varied widely, were sound, and the Department was able to point to their efficiency in the case of some promising examples of young and middle-aged *sâl* forests in the North-West Provinces and Oudh which were already being regarded as classic by the end of the century.

The main drawback perhaps to the majority of the schemes for working the forests under the new Department was the persistence of the old idea that the forests must of necessity be revenue-making concerns. And this in spite of the fact that the majority of the accessible ones were already over-cut and in a destroyed condition. Most of, if not all, the Local Governments were pervaded with this conviction, and this in the face of the clearly enunciated expression of opinion on the part of the Secretary of State and Government of India in the Despatches of 1862 (*vide* I, Ch. XXVIII). For years, in fact up to the end of the period here reviewed, this conviction prevailed. For instance, just before the close of the century the Bengal



UNLOADING RAILWAY SUPPLIES AT A TOWN AND THE CAR IS AN INDICATOR OF
SACRED MANHATTAN, S. N. PHILLIPS, 1897

Government gave expression to the opinion that their Forest Department should be regarded as a purely commercial and timber merchants' Department.

The scientific side of the work, to give effect to which its superior officials received a very expensive scientific training, was little understood, or ignored. It was perhaps due to the gradual introduction of working plans (to be dealt with later), more than anything else, that the Department was able to replace the purely commercial plans of operation or schemes of exploitation by a proper and scientific management of areas of forest, and restrict the felling areas to the "coupe" of the year. When possible, this "coupe" was sold standing, and cut and extracted by the contractor purchasing it. Occasionally this method was not possible, or in fact desirable, in the case where the villagers in the neighbourhood of the forest could be provided with work for themselves and their teams in the forest in this connection. Moreover, in many still almost inaccessible forest areas under the charge of the Department the comparatively small number of trees sold annually were still being marked over sections of large blocks of forest at the close of the century. But, generally speaking, by 1900 two systems had gradually grown up and were in force. Under the first, ingress to the forest was permitted and payments were only made on the material removed as it crossed the forest boundary; under the second, the purchaser was required to previously obtain a permit, in which was noted down the species of trees he required, the dimensions, and so forth.

Each of the systems had its advantages, but it will be obvious that such methods of extraction were only transitory. Since the forests were being managed under the selection system, and in addition only a few species were of marketable value, the methods of extraction of necessity resulted in the removal of all the good trees in the forest, infirm or old and decayed ones being left as seed-bearers to regenerate the forest. Contractors would not buy these, and the Forest Officer was practically compelled to produce a good revenue result! The progress of silviculture remained slow. In 1899 Ribbentrop wrote as follows, in their connection:

"They (the above methods) are a transition stage towards more advanced systems of management, and can only gradually be circumscribed by the provision of working plans. Much has already been done in this direction, and it would, in my

opinion, be unwise to hurry the development towards a system of purely departmental working. The country is not ripe for this as yet, and the progress we have made towards a more systematic and conservative exploitation is satisfactory. A more rapid advance would only cause dissatisfaction, and probably reaction."

There is much in this expressed opinion of an Inspector-General who had held the post for seventeen years which none will cavil at. But it is at least open to serious doubt whether the progress which could possibly have been made by 1900 had in reality eventuated. Under Ribbentrop's own showing the officers of the Department were enormously overworked, and mostly living under conditions which rendered the death-rate and sick list the highest amongst the Services between its inauguration and the close of the century. After-experience would tend to show that progress was retarded by two factors, the failure to increase the staff at a rate proportionate with the increase of its work ; which failure delayed the important work of introducing working plans into areas which imperatively needed them—this delay seriously retarding the recognition by District Officers and, in fact, Local Governments, of the *raison d'être* of a working plan and its necessity. The second factor was the parsimony, almost universal during the period, evinced towards the Department. The sound ideas introduced in this matter at its inauguration to restrain ignorant and extravagant waste, persisted long after they had become obsolete, and militated in a manner, which is now only too evident, against a more rapid progress in the efficient and sylvicultural treatment of the forests, whilst in addition they retarded a more rapid growth of the revenue.

COMMUNICATIONS AND BUILDINGS

It is perfectly well known to the Forest Officer and the merchant who concerns himself with the extraction of timber and other produce from the forest, although perhaps not so well known or realised by the consumer, that the greater part of the cost of extraction or of the price paid for the material by the consumer is usually represented by the cost of its transport. It follows, therefore, that it becomes the duty of the Forest Officer to take every opportunity to improve the communications between the forest and the markets. This



BEHAVIOUR OF THE RAMANGA RIVER, N.W. PROVINCES, A. 1901. II
A. 1901. II

part of forest business proceeded but slowly throughout India as a whole. The records of the period render it apparent that the Department had not grasped to the full the imperative necessity of expediting the work. Far too many suggestions and schemes thought out and put up by experienced divisional officers were turned down by their Conservators on the plea that money was not available for such work. The Conservator was doubtless aware that he would have to fight a battle with his Local Government, and that he would naturally have to take the onus for the success or otherwise of the new departure. But in effect the general attitude to suggestions for employing new schemes of extracting the material from the forests was a *non possumus* one, when these schemes involved an initial outlay of a considerable sum.

At the end of the century, therefore, as a result of this attitude, if the extent of the area of forest being worked is taken into account, the Department had made little advance, save in one or two notable exceptions to be glanced at, from the old-time methods of haulage by elephant or buffalo, and floating (naturally the best of all when possible) or extraction by carts drawn by buffaloes or bullocks along inferior *kutchas* (mud) roads. With few exceptions the railways did not assist to any great extent in the carriage of timber, owing to the high freights charged. In this connection the railways had a very good excuse for the scale of the freights in force. A cheap rate for the carriage of timber in view of the cost involved in providing and maintaining rolling stock and sidings would not pay unless they could be assured of a steady continuance of supplies of timber from a given area. In other words, an assured annual yield of a more or less definite quantity was requisite.

The extraction of such a heavy material as timber was easy in some parts of India, for these regions possessed magnificent waterways. Bengal, Burma, Assam and parts of Madras were notable in this respect and, as has been shown, some of the Himalaya rivers. But great forests in other parts of the country were destitute of such facile means of transit, and the material had to be transported overland.

The slow progress of opening out good communications in these latter regions was retarded by the fact that in the early days of the Department the main lines of communication in the country were extraordinarily deficient and the Forest Officers had their hands full of other important work. But, in

spite of this, it is difficult to absolve the Department and the Local Governments for the negligible amount of progress made in communication and building work during the last fifteen years of the century. And it cannot be gainsaid that the revenue suffered in consequence, for it has become a truism to say that the State benefits financially by improving communications and thereby cheapening the cost of extraction. Ribbentrop, in the following extract from his *Forestry in British India*, admits that the progress was slow and the expenditure on these matters was too small, but he does not appear to have realised that there were other parts of India where the progress might have vied with that made in the North-West Provinces or the fine export works in the Himalaya. He wrote :

“ Before 1880-81 the approximate expenditure on communications and buildings amounted to Rs.1,30,000 per annum or 2.23 per cent of the gross revenue. From then till the end of 1884-85 the expenditure averaged Rs.2,30,000 and the outlay on communications and buildings amounted to 2.48 per cent of the gross revenue. From 1885-6 to the end of 1897-8 the expenditure averaged Rs.3,47,000 per annum, amounting to 2.28 per cent of the gross revenue. During the last six years, however, the expenditure has risen a little more rapidly, but even in the last year under review it only amounted to Rs.4,85,000 or 2.73 per cent of the gross revenue. This can hardly be considered sufficient, and a larger outlay would probably prove remunerative from the outset ; but there is too much work of other kinds, and the Forest Department have till now restricted themselves, as a rule, to the most important works connected with immediate exploitation. A vast field for their energy is still before them, but the work cannot be rushed and careful enquiries must precede the expenditure of money. Moreover, the system of major export lines, such as railways and metalled roads, is still constantly developing, and good feeder roads, which would connect our forest road system with the main arteries of traffic, are only slowly advancing.”

Perhaps the first real work undertaken with the object of improving the facilities for extracting timber was the blasting operations carried out in the hill streams and rivers in Burma and the Himalaya. The former were commenced by Brandis and systematically carried out by the Department and the



DEODAR SLEEPER COMING DOWN A STEEP GRADIENT IN A WET SLIDE.
KUTNI, FAUNSAR, N.W. HIMALAYA. THE WATER IN THE SLIDE PREVENTS
HEATING THROUGH EXCESSIVE FRICTION AND REDUCES THE DANGER OF
THE SLEEPER "JUMPING" THE SLIDE.

Photograph by H. Jackson

Bombay-Burma Trading Corporation, and others who had leases of teak forests in that Province. The Western Himalayan waterways were also greatly improved, and a boom was constructed on the Jumna River to catch the sleepers as they left the hills when they were formed into rafts.

The only serious export works other than roads constructed during the period were the timber slides in the Western Himalaya. The largest was the Bakani slide in Chamba. This was planned by Ribbentrop and constructed by McDonell (subsequently Conservator of Forests in Kashmir). Full-sized logs containing up to 365 cubic feet each were despatched down this slide, a distance of three miles to the river, from a forest which had been previously inaccessible. The sleeper slides in Jaunsar in the North-West Provinces which were associated with a wire rope and sledge-way, were of smaller size but greater length. The earliest of these was built when Captain Greig was Conservator of the School and Central Circles. Others followed, and were fine examples of the work in this direction the Department was capable of, if allowed the chance. Good suspension bridges were also thrown over the Tons River.

Forest tramways were in their infancy, a total of thirty miles being the extent of the length in existence in the whole of the country. Such aids as portable sawmills were unknown—for cutting tea-box planking in the hills in the Eastern Himalaya they might (in the writer's opinion) have been introduced before the close of the century, but a project submitted did not receive favourable consideration.

As regards road communications, the provinces varied very greatly in the progress made in this direction. The North-West Provinces and Oudh easily took pride of place. By the end of the century the Oudh Circle was provided with a complete system of cart roads, whilst a good network of roads also existed in the Central and School Circles. In this respect Forest Officers in less favoured, because less advanced, regions regarded the northern region as the "Model Province." A fine cart road was constructed in Berar, opening out the previously inaccessible Melghat Forest. This work was accomplished by Bagshawe (who was Conservator of the Province in 1900). This officer had also been connected with the fine system of hill roads in the North-West Provinces, most of these having been made by Bagshawe, Eardley Wilmot, and Colonel Campbell when Greig was Conservator. Other parts of India were very back-

ward—Bengal, e.g., outside her waterways in Eastern Bengal and the Sundarbans had little save rough earth roads, or in Singbhum (Chota Nagpur) very rocky ones constructed at a minimum cost per mile, the annual amounts allocated for repairs being absurdly small. In the north, in the Darjiling and east Himalayan forests and the Terai at the foot of the hills, communications were very fair. But the tea-planting community gave considerable assistance in this matter.

As regards buildings, the Provinces as a whole were as backward as was the case with communications.

Generally speaking, the subordinate staff was only moderately housed, though towards the end of the period some efforts were being made to improve the conditions in this respect. The controlling staff either used tents whilst on tour in the divisions, or put up in the rest-houses built at varying intervals in the forests or their neighbourhood. Again the North-West Provinces and Oudh came easily first in the accommodation of this kind provided for their forest staffs. The rest-houses were well-built commodious buildings, fully capable of sheltering the officers from the vicissitudes of an Indian climate. In the Himalaya, both east and west, a good series of rest-houses had been built for the accommodation of touring officers. In other parts of India for the most part the accommodation available was extremely poor, and usually varied from a small, dark mud-walled thatched-roofed one or two-roomed hut to a similar sized edifice roughly constructed of bamboo or grass walls, with a thatch of grass or leaves.

That this important matter of accommodation for the staff was neglected for so long appears to have been due to the fact that in its infancy the officers of the Department had of necessity to live under trying conditions whilst engaged in exploring the forests in unknown country. But that it should have persisted so long appears to have been due to an attitude of mind which did not associate the excessive mortality and sickness which prevailed in the Department at the period with the totally inadequate housing provided for the greater number of the officers. That this would appear to have been the attitude of the authorities seems to be borne out by the fact that in his *Forestry in British India* Ribbentrop dismisses the question of the progress made in the provision of rest-houses and quarters for the staff in five lines.

YIELD OF PRODUCE

The yield of the Government forests in the provinces under the Government of India in timber and fuel was estimated as follows, for the periods 1880-1, 1884-5, 1897-8 :

Period.	Extracted by Government Agency.	Extracted by Purchasers and Permit-holders.
	Trees.	Trees.
1880-81 . .	32,327	108,898
1884-85 . .	148,000	860,000
1897-98 . .	241,000 ¹	1,750,000

Timber and fuel form what are termed the "major produce" of the Indian forest. This class by no means furnishes the only material extracted, however. There remains a very considerable variety of products which are designated "minor produce," and this class produced no inconsiderable proportion of the forest revenue, a proportion which has increased amazingly since those early days in Madras when Conolly collected from his intractable Moplahs and others small amounts, and Michael in the Anamalais encouraged the Kadars to bring in the hill produce, with the object of "ameliorating the condition of this hitherto oppressed race" (I, p. 227).

The chief articles of minor produce used locally are bamboos and grass. The measure introduced for the extraction of bamboos was under the *khan tahsil* system, under which entry into the forests was free and payment only made on the material removed. This method was considered to be the most satisfactory one, provided the demand did not exceed the capabilities of the bamboo forests. This was not, however, by any means invariably the case. For instance, during the closing years of the century the writer was in charge of the Chittagong Division embracing the forests of the Collectorate, from which all large tree growth had long been cut out and the demand for bamboos was enormous, and the extensive forests of the Chittagong Hill Tracts. In the former a regulated system of exploiting the bamboo forests was much overdue, the supervision over the felling and extraction being gravely

¹ For purposes of comparison with the figures of 1880-1 and 1884-5, these figures exclude the yield from forests in the Madras and Bombay Presidencies.

complicated by the paucity of staff in charge of this much overgrown division and the presence of numerous tea gardens blocking access to important blocks of these forests. Attention to the necessity of introducing a scientific management into the management of bamboo forests did not, however, commence in the forests of this nature in Bengal. During the period it was in the North-West Provinces that the step was taken for the first time in India. In this Province it was at length recognised that this class of forest, which was of moderate extent, was being ruined partly on account of the excessive demand and partly owing to the increase of large herds of elephants. To decrease the latter nuisance successful "kheddah" operations were undertaken, whilst rules were drawn up prescribing a more conservative felling of the bamboos. Somewhat similar measures were taken for the comparatively small areas of bamboos in the Punjab.

It was commonly held by competent authorities that the estimated yield of bamboos during the period was far below the number extracted from the forests annually, and many divisional Forest Officers of this time will probably be able to vouch for the correctness of this opinion. The forest divisions were far too large and the staff too small and, incidentally, the lower grades too inadequately paid to enable Government to have received the full dues on an article so easily transportable and in such universal use as the bamboo. Moreover, the commercial aspects of the bamboo had not received full recognition. Its possibilities for the manufacture of paper pulp, although tentative proposals and attempts had been made, had received no serious recognition from the Department. When Schlich was Inspector-General a consignment of bamboos had been sent home from which Messrs. Routledge made paper; but it was stated that the process of treating the bamboos was still too costly to make the business profitable. A quarter of a century was to pass before the matter was adequately dealt with. Nor had a commercial outlet been found in India for the bamboo for that article of universal use amongst the natives, the umbrella. In Chittagong the writer went into this matter in some detail, but the price offered by merchants precluded the possibility of supplying the article demanded without a serious loss to the Department. The divisional officer had not at his resource either the time or necessary knowledge which could have made such transactions a financial success. And



THADAR ON THE JONG RIVER IN THE THUK-GARHAI CAGED FORESTS (N.W. HIMALAYA)
 FROM WHICH GREAT AMOUNTS OF DEODAR AND CHIR TREES (SANTALS) WERE FLOATED
 TO THE JUMNA RIVER, WHERE THEY WERE CUT OFF AT THE BRIDGE AT DAKHPATHAR, MADE
 INTO RAFTS AND TAKEN TO OTHER THE SUSPENSION BRIDGE IS ONE OF THE OTHER PAIR
 THEN BUILT OVER THE JONG RIVER, CIRCA 1888

the Forest Research Officer, the economist, had not made his appearance in India at the close of the century.

The yield from the bamboo-producing areas under the control of the Forest Department was estimated at 82,000 in 1880-1, 120,300,000 in 1884-5 and 140,842,000 in 1897-8, the corresponding values being Rs.3,31,000, Rs.4,85,000 and Rs.5,68,000 respectively.

Next to bamboos, grass, as represented by the grazing of village cattle, forms a most important item in the management and revenue of the Indian forests. It has been already shown that the grazing question in its effects on the forests engaged the attention of the officers connected with forest management from the earliest days. It was recognised that the universal practice of grazing their cattle at will in the forests, accompanied as it was by the firing of the areas with the object of getting up a new crop of young grass as soon as the early rains of the monsoon fell, was inimical to reproduction and injurious to the young tree crops. The practice had been in force from time immemorial. But the excessive damage occurring from this unchecked practice became a serious danger to the community as a whole, owing to the increase in the population and of the vast herds of cattle which half a century of orderly British rule brought about. The position of this matter at the end of the century is well dealt with by Ribbentrop, and his views on the subject are given in the following extract :

“ In most instances the grass crop is as yet reaped by the most wasteful of all methods—viz., by grazing. It is well known that in this manner less than 30 per cent of the grass crop is realised, the rest is trodden down, or consumed by fires ; the reproductive power of the forests is greatly reduced, and year by year the coarser grasses increase in proportion, and the value of the pasture is depreciated. This has, however, been the custom of the country from time immemorial and cannot be changed suddenly, however desirable. The increase in the number of cattle has always been regarded as one of the standards of agricultural prosperity, and such increase has no doubt been fostered by the existence of large grazing areas. The cattle, however, bred under such conditions are, as a rule, of no great value, and in the drier zones are annually exposed to want, and in unfavourable seasons to starvation. The number of cattle is therefore constantly fluctuating ; a few favourable seasons, and they increase to the maximum that can find grazing ; a few seasons of drought, and they die off again. Indeed, the facilities offered to grazing in Government forests are so great as to offer a positive premium to over-breeding, and therefore to the deterioration of the

breed ; quality is thus sacrificed to quantity. This is of course unsatisfactory, but the conditions of the country render any sudden change in the present system impossible ; and it is but natural that the *raiya*t should prefer to send his cattle to graze, to cutting and carrying the grass for them. It is infinitely more comfortable, and it is not to be expected from the common peasant that he should see the danger ahead, and be able to judge correctly of the advantages derivable from a change of this old custom.

Several Local Governments have of late years given great attention to this subject, and to the establishment of grass and fodder reserves, by which a certain portion of the forest and grass lands is withdrawn from the general annual grazing, and partly opened during the months in which the grass is scarce and partly only in years of distress.

This was an important step towards a more conservative treatment of the grass crop, though it seems doubtful whether it has been carried out with the thoroughness originally contemplated. A more rational treatment of the grass crop, however, is spreading, and develops fairly rapidly whenever the grass becomes of commercial value. I remember the time when fires on the hill-sides between Simla and Kalka were as common as they are still on the hills north of Dehra, but there are none now ; the grass is all cut and stacked. This is, of course, quite a special case ; but in the Berars, parts of the Bombay Presidency, and even in some of the old headquarters of the nomad grazier, agriculture gains, and we see fodder and grass stacked and even sold. In the Amritsar District in the Punjab, the Forest Department tried to create forest reserves in 1870, or about that time, of some of the extensive wastes still in existence, but it was stated that the areas were indispensable as grazing grounds. Now they are mostly cultivated and their want is not felt.

The systems of regulating the grazing vary greatly in the different provinces, and even in districts of the same province. In some cases the grazing over the areas not closed for forest reproduction is let to contractors, who make their own arrangements to collect fees from the cattle owners ; in other cases the cattle grazing are enumerated within the forest or grazing areas, and a fee is levied per head ; in others, again, the villagers pay on an enumeration of the cattle in their possession, which are then allowed to graze in certain forest areas, or sometimes even over all forest areas of a district. In these instances plough cattle are sometimes admitted at lower rates ; sometimes cows are admitted free, calves at heel always, and frequently older calves. Pack cattle belonging to tribes of carriers are in the Central Provinces admitted to all open grazing grounds of the province under a general pass.

In many instances cattle are grazed free within Government forests by rights acquired under forest settlements. This, of course,

is unavoidable, but such free grazing, or grazing at lower fees, has often been extended by Local Governments as a privilege to other villages for no other reason than that they are situated within a certain distance of the Government forests. These privileges are theoretically revocable, but have in practice the same force as legal rights. Cattle belonging to forest villages which supply the labour for fire-tracing and other forest work, and frequently occupy part of the State forest as tenants, are, as a rule, admitted under free passes.

It is in the interests of the State to utilise its forest property to the full extent of its capabilities, and to sell all its produce, including grass, to the best advantage of the exchequer as well as of the *raiya*, and to allow grazing where it can be done without endangering the well-being of the forests, and when it would be most profitable for the *raiya*; but natural forest areas cannot be treated in the same manner as *bona fide* grazing grounds, such as the alpine pastures of the Himalaya and the *bar rakhs* of the Punjab.

Numerous rules have been promulgated to regulate and organise the grazing; but however carefully they may have been prepared, it is impossible that they should meet every case. As a matter of fact they tend to give a general fixity to a system which under certain conditions is wasteful, and under such conditions should be allowed to die out gradually.

The conditions, which vary in each forest area, can only be satisfactorily met by suitable prescriptions in working plans and not by general rules."

Ribbentrop in the above extract does not specifically mention or lay stress upon two difficult aspects of forest grazing which confronted Forest Officers during this period. The first was the custom of big and locally powerful cattle merchants who at certain seasons of the year sent large herds of cattle to graze in forest areas situated at considerable distances from their own headquarters. The appearance of these large herds was frequently a source of grave difficulty. If the owner was supported by the civil authorities, the Forest Officer was ordered to admit the animals. This often proved a hardship to the local villagers, since the number of animals so admitted to the area was often far in excess of the amount of grass available. The natural consequence was that the grass was quickly grazed and much of it trampled down, the big owner removed his animals elsewhere and the local village cattle suffered famine conditions. It is perhaps unnecessary to add that the regeneration of these areas under such conditions was impossible. A second serious problem was the question of the provision of grazing for milch cattle in the neighbourhood of large civil stations and cantonments. The supply of milk was, of course,

imperative, and the cattle owners had, and knew that they had, the support of the local District Officer, and treated the forest subordinates in a high-handed fashion and openly disobeyed the rules in force. Instances of these difficulties will be treated of in a later chapter, but the problem of providing grazing plus milk, and at the same time preventing the forest from deteriorating and eventually disappearing owing to the absence of natural regeneration, often proved one of extraordinary difficulty for the Forest Officer; and more especially was this the case in mountainous regions.

The income derived from the sale of grass and grazing for the period 1880-1 to 1897-8 was as follows: 1880-1, Rs. 9,57,000; 1884-5, Rs. 12,48,441; 1897-8, Rs. 13,51,350.

These figures, however, only represent about half of the value of the produce actually extracted or consumed in the forest by grazing animals. The real market value of the grass was rarely realised, and much of the material was consumed under rights or as free concessions. The estimated value of these latter was Rs. 13,45,124 in 1897-8.

The chief of the other minor products in demand during the period were caoutchouc, cardamons, cutch, lac, myrabolams and resin. In view of the very great development made in researches into and sale of minor products of the forests in the first two decades of the twentieth century, the progress made in the sale of such products during the period of thirty years here dealt with cannot be regarded as other than disappointing. And this must be said even when the very heavy work the overburdened staff had to cope with during these three decades is taken into consideration. During this period the exploitation of the minor products above enumerated was almost entirely in the hands of purchasers and permit-holders, and it may be added that most of the profits went to middlemen. It is true that in the case of such products, rubber and resin are cases in point, it was necessary for Government to lead the way and prove that they existed in the forests in amounts which could be extracted on a commercially profitable scale. But the initiative shown for the most part was surprisingly small.

Ribbentrop (*Forestry in British India*) describes the position of these minor products in 1900 as follows:

"India's trade in caoutchouc—the product of the *Ficus elastica*—is decidedly on the wane. From 1870-1 to 1875-6 the export averaged 785 tons per annum; from 1892-3 to 1896-7, 422 tons; and in 1897-8 it fell to 278 tons only. At the same

time the price rose from Rs.1,356 to Rs.3,038 per ton. If, therefore, a larger quantity of rubber was procurable, it would be forthcoming. A very small proportion of all the rubber exported from India is produced within the country under effective control, and we may safely assume that the trees which yielded the larger supply are dead. There are other species in India producing fairly good caoutchouc, but they also appear scattered about, and their rubber is difficult to collect and bring in a sound state to market. The Burma Government are about to undertake experiments both as regards the collection of cutch from the forest-grown trees, and the establishment of plantations of caoutchouc-yielding trees of various kinds."

These experiments and the rubber plantation in Assam will be dealt with elsewhere.

"The trade in cutch has of late years been seriously affected by the introduction of more scientifically prepared substances of a similar character. However, nothing is required but the introduction of similar methods in order not merely to regain the former position, but to improve on it, as India is very rich in tannin-producing species.

The trade in myrabolams has largely increased, and during late years has maintained itself at upwards of 44,000 tons against less than 18,000 tons in 1876-7. The price, however, has not advanced in the same measure as that of tannin extract, having only risen from Rs.75 to Rs.80. The price of extracts during the same period has increased by 100 per cent, but the demands, as regards the quality, are much higher than they were in 1876.

The trade in cardamons is really unimportant but interesting, as being one of those small enterprises or gambles which but a few initiated ones understand. The produce varies in price at the shortest notice as much as 25 per cent. and apparently without reference to the amount locally produced.

The resin of *Pinus longifolia* has only of late years been introduced into the market, as colophony and turpentine, by Government, who built a distillery on a small scale at Dehra Dun. Both the colophony and turpentine produced are equal to the best French product, and the Indian trade and manufactures, being quite certain of getting a perfectly pure article of the first quality, are absorbing all that is manufactured. Two more factories are being set up with a view of transferring

the manufactory, when fully established, to private enterprise. A distillery on a somewhat larger scale is also being set up in the Kangra Forest of the Punjab.

There are many other products, such as sabai grass for paper-making, fibrous plants, etc., in which small local trade exists, or is gradually springing up, and I have no doubt that the Forest Officer of the future will still find many sources of wealth which we have overlooked, undervalued, or not understood."

In the chapter on Bengal the writer will have occasion to allude to the development in the sale of sabai grass in that Province.

FINANCIAL RESULTS OF FOREST ADMINISTRATION

The financial progress of the Department can best be judged from the following statement of annual averages.

Period.	Revenue.	Expenditure.	Surplus	Percentage of Expenditure to Revenue.
	Rs.	Rs	Rs.	Per cent.
1864-65 to 1880-81	53,54,900	35,25,000	18,29,900	65.8
1881-82 to 1884-85	99,54,100	63,51,400	36,02,700	63.8
1885-86 to 1897-98	1,51,87,400	86,21,000	65,66,400	56.7

The average quinquennial growth since 1864-5 has been as follows :

Quinquennial periods.	Gross Revenue.	Expenditure.	Surplus.	Proportion of Surplus to Gross Revenue.
	Rs.	Rs.	Rs.	Per cent
1864-1869 . .	37,40,000	23,80,000	13,60,000	36
1869-1874 . .	56,30,000	39,30,000	17,00,000	30
1874-1879 . .	66,60,000	45,80,000	20,80,000	31
1879-1884 . .	88,20,000	56,10,000	32,10,000	36
1884-1889 . .	116,70,000	74,30,000	42,40,000	36
1889-1894 . .	159,50,000	86,00,000	73,50,000	46
1894-1899 . .	172,00,000	98,00,000	79,20,000	45

The revenue of the year 1898-9 amounted to Rs.1,90,38,520, or £1,270,000.

The expenditure of the year 1898-9 amounted to Rs.1,00,33,920, or £670,000.

The surplus of the year 1898-9 amounted to Rs.90,04,600, or £600,000.

On the subject of the progress made in this direction Ribbentrop gives the following tabular statement :

A. RECURRING.

Various Heads.	1880-81.			1884-85.			1897-98.		
	Amount.	Proportion of Expenditure to Gross Revenue.		Amount.	Proportion of Expenditure to Gross Revenue.		Amount.	Proportion of Expenditure to Gross Revenue.	
		Rs.	Per Cent.		Rs.	Per Cent.		Rs.	Per Cent.
(a) Administration—									
(1) Superior Staff	11,53,970		15.62	15,28,326		15.00	22,06,940		12.40
(2) Exchange Compensation Allowance	—		—	—		—	1,27,140		0.71
(3) Subordinate Staff (including Rangers, Foresters and Guards)	5,34,741		7.24	7,08,453		6.95	16,29,880		9.16
(4) Office Establishments (including Contingencies)	3,11,893		4.22	4,69,350		4.61	8,66,940		4.87
(b) Working—									
(1) Extraction	19,38,167		26.24	27,31,498		26.81	29,06,920		16.34
(2) Roads and Buildings	1,69,431		2.29	2,77,870		2.73	4,85,030		2.73
(3) Fire Protection	8,888		1.09	1,29,378		1.27	3,13,600		1.76
(4) Cultural Operations	3,12,571		4.23	5,61,674		5.51	3,60,200		2.02
(5) Live stock, stores, tools and plant	1,01,537		1.38	1,53,072		1.47	2,47,490		1.39
(6) Working plans	—		—	—		—	72,920		0.41
(7) Rent for leased forests	1,00,156		1.36	1,03,114		1.01	1,40,150		0.79
(8) Miscellaneous	37,590		0.51	58,847		0.58	1,13,210		0.64
(c) Expenditure on realization of revenue from forests not managed by Government	7,133		0.09	14,505		0.14	10,400		0.06
(d) Forest Science and Education (including all "A" and "B" charges of Forest School)	—		—	41,099		0.40	71,930		0.40
Total	47,48,077		64.27	67,74,186		66.48	95,52,750		53.68

B. EXTRAORDINARY.

(a) Forest Settlement	19,681	0.26	1,19,545	1.17	65,520	0.37
(b) Forest Surveys	34,870	0.47	52,031	0.79	4,51,030	2.53
(c) Forest Demarcation	67,197	0.91	80,748	0.51	1,26,430	0.71
Total	1,21,748	1.64	2,52,324	2.47	6,42,980	3.61
Grand Total Expenditure	49,69,825	65.91	70,26,510	68.95	1,01,95,730	57.29
Net Revenue	25,17,663	34.09	31,63,660	31.05	75,99,760	42.71

"It may be interesting to compare for different periods the revenue and expenditure under the various heads, with the proportion of the gross receipts expended, and I add it for 1880-1, 1884-5 and 1897-8 :

GROSS RECEIPTS.

Various Heads.	1880-81.	1884-85.	1897-98.
	Amount.	Amount.	Amount.
	Rs.	Rs.	Rs.
(a) Wood	51,88,671	76,36,624	1,37,39,530
(b) Minor forest produce	6,75,503	10,02,062	12,04,160
(c) Forest stamps and commutation fees for forest produce	92	—	5,71,200
(d) Grass and grazing	9,57,720	12,48,441	13,51,350
(e) Revenue from forests not managed by Government	4,00,224	95,869	3,52,410
(f) Miscellaneous	1,65,078	2,07,174	5,76,840
Total Revenue	73,87,488	1,01,90,170	1,77,95,490

Commenting on the above figures as a result of the work of the Department during the thirty-six years since its inauguration, Ribbentrop wrote :

"The cash revenue is not the only benefit the forests under the administration of the Department confer on the country. The value of forest produce annually consumed by right holders, given away by Local Governments as privileges and free grants, is very large indeed. It has only lately been attempted to estimate the value of such concessions, which during 1897-8 amounted to 35 lacs of rupees. This figure does not include the value of produce from forest areas and waste lands outside the control of the Forest Department, where *mostly* no restriction whatever exists."

It will be noted from the above figures that the forestry estate managed in the interests of the peoples of India had vastly increased in value from the beginnings made in 1864. By 1900 it was a great charge, and one whose value to the country was incalculable. And if this was true in 1900, and it was undeniably true, it will be seen as this history develops that this vast estate is of infinitely greater value to-day, and has a potential value in the future which it is difficult to estimate.

CHAPTER XVII

THE PROGRESS MADE IN THE PROTECTION OF THE FORESTS, 1871-1900

ONE of the first questions which faced the officers appointed in the different provinces to the newly constituted Forest Department was the necessity of protecting the forests from the chief sources of injury to which they had been subject from time immemorial, reckless cutting, firing and grazing with the aftermath of serious erosion, under which their value in the more populous parts of the country was surely becoming decreased to a point which would finally reduce them to a practically worthless scrub. This proved a matter of the greatest difficulty.

It has been shown in previous chapters that the people looked upon the forests as a class of property in which, although they did not possess the ownership, they could enter and hack, burn, or graze their cattle at will. In the Central Provinces, for instance, large trees would be felled by the aborigines merely to collect the honey and wax from a few combs in the crowns of the trees, or in Burma to collect leaves from them for cigarette wrappers. The author saw instances of the former in the Chota Nagpur sâl forests as late as 1897, thus indicating how difficult it had proved to eradicate these long-prevalent ideas on the uses to which the forests could be put. Again, the method of shifting cultivation practised by the inhabitants of the hilly tracts throughout the country had resulted in the destruction of thousands of square miles of forest actually felled for the purpose, whilst fires from the burning of the cleared area spread into the adjacent forest and committed more havoc. The owners of cattle, moreover, annually fired the forest in order to get rid of the old dry, inedible material and thus obtain a new crop of young grass for their herds to feed upon as soon as the first rains made their appearance. The forests were also fired by hunters in order to enable them to move about more easily, and the same practice was resorted

to in the areas in which heavy fellings were being undertaken by the representatives of timber merchants. Even after a forest law had been promulgated and when the boundaries of the forests had been clearly laid down on the ground the aligned boundaries did not at first convey anything to the neighbouring population, and the latter had to be educated into their meaning before it was possible to satisfy a court that the people had become cognisant of the fact that the forest inside a boundary was no longer open to the malpractices of any and every one who cared to go into it. The Indian *ryot*, a most conservative individual, faced the new position of affairs with extreme reluctance. The prosecutions which had to be instituted for offences committed against the new forest law brought the Forest Officers into bad odium with the natives for a considerable period of years after the first introduction of the amount of protection absolutely necessary if practical Forest Conservancy was to adequately take its place in the economic scheme of administration of the country. The ill-feeling this forest police system and its work engendered was not confined to the people, but for years found its counterpart amongst many of the district officials in the forest districts. It was perhaps natural that the native officials from highest to lowest should sympathise and side with the people. They had absorbed similar views upon the subject of the forest and failed to understand that any necessity existed for its protection and closure to unrestricted acts of destruction. This feeling on their part persisted for many years, and to such a degree that it became necessary for the Government of India to issue an order that prosecutions of forest offences, especially fire offences, should not be undertaken in the court of a native magistrate unless he had first-class powers. It was not that the native magistrates intentionally let the convicted persons off lightly, but that they entirely failed to grasp the magnitude of the offence and resultant damage done to the forest; or the great risk to the forest which resulted from the commission in it of some, in itself, trivial offence, such as lighting a fire in the dry season to cook food, smoking, etc., from which no actual injury to the forest had accrued. But for a considerable period European magistrates were almost equally lenient in their punishments for forest offences. And this view-point can only be attributed to the ignorance which existed at the time amongst the British peoples on the subject of forestry and what it aims at and means to a nation, and especially to a great



TYPICAL EXAMPLE OF THE FOREST ON A HILLSIDE IN SIKKIM DESTROYED BY FIRE. THE GROUND IS BECOMING COVERED WITH THE MATING BARKERS (*DIAPYCETUS* sp.). TOUNGHOO RIDGE 8800

1111. RUNGEL VALLEY BELOW

Photograph by Professor H. J. Smith

agricultural population such as India possesses. This question of the protection of the forest in these early days of Forest Conservancy was aggravated by the Forest Officers in two ways. In the one the more zealous officer in charge of a newly demarcated area with all the boundaries laid down on the ground wished to keep to the strict letter of the law and thus from the outset press hardly on the people, instead of leading them by slow degrees to an understanding of the new regime ; in the other by the slack or unnecessarily weak Forest Officer who wished to keep in with the people, and perchance with the officials of the district, and practically allowed the old state of affairs to go on almost unchecked. Both gave almost equal trouble in their several ways and put back the work of introducing real protection. For the first gave full cause for just resentment which often found support in high quarters, equally uneducated in matters pertaining to forestry, and thus put back forest progress in the particular district or even throughout a whole province ; whilst the attitude of the second led people and official alike to believe that this matter of the protection of the forest was not really a necessity, a matter of life or disappearance of the forest estate, but merely a fad or desire of the new Forest Department to exert its authority over and oppress the people.

Can it be wondered at, therefore, that this matter of protection was the source of much friction and heart-burning out in the districts, and one of grave disquietude to those in authority who were responsible for introducing a proper system of conservancy into the forests ? Fortunately, from the very magnitude of the task and areas which had to be dealt with, protection could only be introduced slowly, progress could only be made step by step. Thus this matter of introducing protection throughout the forests of India, not yet complete in the remoter parts, only proceeded gradually, and the bad mistakes in action or policy made at first were rectified and guarded against in other parts in later years.

Naturally the worst mistakes were made and the greatest friction was engendered in the provinces which had the largest population and the smallest areas of forest to satisfy its requirements ; whereas owing to slower development in those with extensive areas of forest, as in the Central Provinces, for instance, matters were easier to deal with, and a strict protection was only introduced gradually.

The district Forest Officer himself had an unusually hard time

of it. The success or otherwise of the protective administration of his forests came to be gauged from tables submitted with the Annual Reports exhibiting the number of cases regarding forest offences taken into court as compared with the number of convictions obtained; and the number of cases voluntarily compounded with the Forest Officers under the provisions of the Forest Act. This was very far from being an ideal check, although it was admittedly a difficult matter to find a better. In a way it served to show that the people were not being unnecessarily harassed or oppressed by the forest officials; on the other hand, so far as convictions were concerned, it left the latter for many years almost entirely in the hands of the subordinate native magistracy, and, as has been said, this class failed to appreciate the importance of properly protecting the forests, and either failed to convict or let the offender off with a small and quite inadequate fine. Owing to the fact that of all classes of offences those committed within a forest area are the most difficult to bring home to an offender, since it is often the merest accident that an offender is caught in the act, this practice on the part of the magistrates proved most injurious; for it gave rise to a class of offenders who habitually broke the forest law and stole material from the forests for sale, or otherwise, and gladly paid the small fine inflicted in the rare cases in which they were caught and convicted. By the end of the period dealt with here (1900) the percentage of convictions had, however, risen to 81 per cent, which sufficiently proved the carefulness exercised by the forest officials in prosecuting offences in court. The tabular method of gauging the efficiency of a forest district left much to be desired, and it was ultimately recognised that the true gauge of an efficient protection was the present state of each individual forest. This cannot be exhibited in tables. That the protection of the forest tracts under adequate conservancy by the end of this period had reached a high degree of efficiency, so far as fire, grazing and illicit felling was concerned, was admitted. The exceptional cases where the forest property of the State was decreasing in productive power and consequently in value was usually not due to inadequate protection, but to the existence and exercise of rights within the areas which were in excess of the potential capabilities of the forest and therefore destructive to improvement, or, less usually, to the rapid growth within the tracts of undefined privileges. The extinction of such rights and privileges was usually not

within the power of the forest officials, although they fully recognised the inevitable results on the forest of their continued enjoyment by the holders.

Next to fire protection the grazing question had to be dealt with. In a previous chapter it has been shown that the population of India in olden time was largely a nomadic pastoral one, the flocks being grazed in the areas adjacent to the locality occupied by their owners. Constant warfare was carried on against the forest in order to clear it away, or at least so lighten the overhead cover by felling sufficient of the trees to enable crops of grass to be obtained. Fire and the axe were the chief weapons employed by the people in this constant struggle against the great forests which covered the country in those ancient times, and this warfare was still in active progress at the time the British first began to extend dominion over the country, and was continued for some sixty years thereafter before an initial attempt was made to institute some check on this universal practice of regarding the forest areas as the grazing grounds of the people. The herds of cattle of both sexes thus turned loose in the forests were of an excessively poor type, the outcome of unsupervised interbreeding, the animals unclean and half starved, and the milk obtained from them of a very inferior quality; a good cow of this kind only yielding three quarts a day, whilst the hides obtainable were of very inferior quality. In periods of scarcity and famine, following a failure of the monsoon rains, millions of these miserable beasts were swept away. Some regulation of unrestricted grazing became necessary in the Government Reserves, and its introduction was the source of great trouble and not a little friction, as in the case of the introduction of fire conservancy.

The dangerous effects of erosion, especially in the drier parts of the country, formed another branch of protection work with which the Forest Officer had to deal. Some aspects of this matter have been already glanced at, whilst others will be dealt with later.

Another side of the protection work of the forest which had received but scant attention during the period here dealt with, was the injury caused to the crops from insect and fungus attacks. This aspect of protection will be alluded to towards the close of this chapter.

The progress made in these various forms of forest protection will be now considered.

SHIFTING CULTIVATION

This history will have abundantly shown that the practice of shifting cultivation had been in force amongst all the aboriginal tribes throughout the forest areas in India from time immemorial. It was one of the first of several pernicious customs which prevailed amongst the people which Forest Officers endeavoured to put down. A considerable period of years elapsed before the Government realised that steps would have to be taken to combat this wasteful form of utilising the forests.

By the end of the century in the provinces (except Madras) and in Burma, with the introduction of proper Forest Conservancy, shifting cultivation was gradually prohibited in all Reserved Forests and restricted as became possible in Protected and Unclassed Forests, although in the latter category it persisted in the wilder parts of the country, especially in Assam and North Burma, till the close of the period under review. In Burma it was taken advantage of (as will be shown in Chapter XVIII) to form teak plantations. The prohibition of the method could only take place gradually in the wilder tracts, since the jungle tribes who practised it had no other means of cultivating the land, and only by a process of gradual civilisation was it possible to bring them to settle down and take up a higher form of agriculture and forsake the nomadic system of life they preferred and were accustomed to. But the results of the activities and perseverance of the officers of the Department in this direction have saved to India a great forest estate becoming yearly of higher value, an estate which is of incalculable value to the population of the country.

As has been shown, the Madras Government, under Cleghorn's advice, prohibited this form of cultivation (*kumri*), but subsequently withdrew the prohibition, chiefly owing to their unwillingness to settle the rights to village and waste lands. This mistake resulted in great injury to the country and its inhabitants. In 1863 Brandis and Cleghorn had drawn up a joint Memorandum, which was sent to the Government of Madras, urging the necessity of the early demarcation of the Government and village forests of the Presidency. The proposals were not approved, and in spite of persistent representations made by the Government of India on this subject, no adequate action was taken by the Madras Government towards effecting a separation of the various rights and interests in the public

forests and waste lands until Brandis was deputed to Madras and the Madras Forest Act was passed in 1882. And *kumri* cultivation, which Cleghorn had got prohibited in 1860, enjoyed this long new lease of life to the detriment of the forests of the presidency.

THE PROGRESS OF FIRE PROTECTION

From what has been already written on the custom of the people of annually firing the forests, either of direct intention or from carelessness, it will be easily understood that the problem of introducing a proper and effective fire conservancy of the forests into India was one of extreme difficulty. The climate of the greater part of the country was of a nature to favour the spread of a fire during the torrid, rainless months of the hot season when the forests are full of inflammable materials. But the opposition and obstructions offered to the introduction of methods to protect the forests from this danger would not have been so general in every province had not the new policy interfered with the immemorial custom of the people in setting fire to the rank dry grass in the hot weather in order to get up a new crop with the first rains ; these fires once lit were allowed to run their own course, and were often fanned and spread over a considerable area by the strong hot wind which blows at this season. Fires for centuries past had spread in this way from the clearings made for shifting cultivation, the people practising this form of cultivation rarely taking the trouble to protect them from fire or to prevent the fire spreading outwards from the clearing through the neighbouring forests. The Karens in N.E. Burma and the people of the Garo Hills in Assam were exceptions in this respect, for both tribes took some trouble to prevent fire from entering or spreading from their clearings.

In every Province, therefore, the officers of the Department had to commence the work of introducing fire conservancy for the protection of the forests in the face of an actively hostile population more or less supported by the district officials, and especially by the Indian officials, who quite frankly regarded the new policy of fire conservancy as an oppression of the people. As has been shown, the Forest Officers themselves in the earlier days of the Department were openly sceptical of the possibility of protecting the forests from this calamity. It is scarcely surprising, therefore, that the progress was slow, and that the factor of the individual

and his method of handling the matter in a particular district hastened or retarded the introduction of an efficient system of protection.

Writing of the Trans-Sarda Forests, as he found them in 1873, Eardley Wilmot, in his *Forest Life and Sport in India*, says: "The whole area had been devastated by fire and by unregulated felling. The forest was burned out every year by the Tharus to clear the undergrowth for hunting, and by graziers to obtain a crop of young grass" (*vide* pp. 367, 370).

A curious point in connection with the habit of the people in thus firing grazing areas and forests, either to secure some particular purpose of their own or through sheer carelessness, was the objection a village evinced to a fire, started by a neighbouring village, entering its own boundaries. Such occurrences frequently gave rise to sanguinary affrays in the old days, and subsequently under British rule had to be punished by the infliction of heavy fines.

Writing in 1900 in *Forestry in British India*, Ribbentrop thus sums up the history of the introduction of fire protection into the forests.

"An incalculable amount of good has already been done during the last ten or fifteen years by the gradual prohibition of *kumri* cultivation; and at a low estimate forest which was formerly razed to the ground once every fifteen or twenty years is now permitted to grow up on 5000 square miles within the Government forest property of the Central Provinces alone. Though, however, saved from entire periodical destruction, the areas are still overrun by forest fires. These, in certain provinces almost general, conflagrations are the chief reason of the barren character of so many of our Indian hill ranges, and are more closely connected with distress and famine than is usually supposed. Their influence is more hurtful in proportion to the dryness of the region in which they occur. This state of things is, of course, incompatible with increasing civilisation, and cannot continue long; for the people whose property is damaged by such conflagrations will sooner or later seek the protection of the courts—a protection which at some future time will probably be impossible to withhold even from right-holders in Government forests. Forests and waste lands, with the exception of reserves and protected forests and village forests constituted under the Act, are at present practically unprotected by the law of the

country, and it will soon become a matter for consideration whether the special circumstances in this respect will not necessitate special and more extensive measures.

In the early days of forest administration another great difficulty was a most marvellous, now almost incredible, apathy and disbelief in the destructiveness of forest fires. It was argued that forests exist and produce marketable timber which from time immemorial have been overrun by jungle fires. This could not be denied, and it was useless that the Forest Officers preached that the forests were deteriorating gradually, and pointed to the numerous treeless bamboo jungles and grass savannahs. The people would not believe that the majority of these areas had been once forest clad."

A few District Officers had realised the true position before Ribbentrop's time, as is evidenced by Lord William Hay's trite summary in 1864 of how a forest disappeared (*vide* I, p. 481).

"It takes a long time," says Ribbentrop, "before a mixed deciduous forest in India is entirely eradicated. Amongst the numerous species of which it is frequently composed, there are many which have a thick bark, a tough life and a marvellous power of resistance against fires. After a fire has swept a few times over the forest, the compactness of its canopy gets destroyed and each successive fire leaves it more open. This being the case, the danger is reduced to a ground fire, which cannot touch the crown of the trees, between which the interspersed dead trees glow year after year like a torch till they are gradually consumed, doing but little and constantly less harm to their wider and wider disconnected neighbours. As time goes on the process of destruction becomes thus slower and slower, but the end is none the less certain.

When the Forest Department came into existence the great majority of the forests in India, excepting, of course, the ever-green jungles and tracts which for some reason or other were self-protected from fire, were in an extremely poor condition, open and interspersed with grass blanks, large areas frequently containing no tree-growth whatever. Many are still in the same state, and some have even gone further backward, because of the impossibility of extending fire protection more rapidly than has been done.

Where the whole countryside is ablaze each hot weather it is only by isolation that certain areas can be protected. The work was started in Madras about 1860, but the records are

incomplete, and perhaps refer only to the Nilambur plantation and some other selected portions. However that may have been, the work did not progress, and as late as 1882 we only find 300 square miles under protection, and in our forest records we are accustomed to look at the protection of the Bori Forest in the Central Provinces (*vide* p. 223), as the first practical solution of the problem on which all future extensions were based, with such modifications as the conditions of the forests and undergrowth rendered advisable. Bori is also one of our show places representing an entirely restored forest, which must convince the most sceptical of the advantages of continuous fire protection at any cost. Major (now Colonel) Pearson's name is for ever connected with that admirable piece of work." Ribbentrop omits to add that Pearson had the powerful support of the Chief Commissioner, Sir Richard Temple, who did so much to aid the start of forestry in the country. Brandis describes the result attained in the Bori Forest after a few years of protection from fire. It is a remarkable lesson for us all, and worthy of careful consideration in the parts of our Empire where forest protection is yet in its infancy. "Within a few years," says Brandis, "the conditions of the forest entirely changed. The extensive grass lands and smaller blanks in the forest gradually filled up from the edge with coppice shoots and self-sown seedlings; the soil, which hitherto had been hardened and sterilised by the annual fires, became fertile; the trees increased rapidly in height and girth and the new shoots of the bamboo taller and stouter." Captain (later Colonel) Doveton, Major Pearson's successor, extended fire protection in the Central Provinces with the greatest energy and success, and reduced the cost of the operations to a minimum. In the meantime Major Pearson introduced the same methods in his new charge, the North-Western Provinces. In Bombay also fire protection was taken up fairly early, and nearly 7000 square miles were reported as protected in 1881. Ribbentrop continues:

"Though the work was practically taken in hand only in 1865, 11,000 square miles of forest land were at the end of 1880-1 artificially protected from fire; by the end of 1884-5 this area had been increased to 16,000 square miles, and in 1900 amounted to 32,000 square miles.

On the one side this gives, however, a more favourable view of the question than is really the case, for the success of

operations varies considerably, and areas saved one year may be burned over in another ; but on the other side the fact must not be lost sight of that the area under control of the Department contains much forest which is protected by its own natural conditions.

The forest laws give sufficient power to protect our reserved forests from fire, and are sufficiently stringent even in the case of protected forests, but do not affect the open jungles, which frequently abut on more favourable forests. These may be burned unrestrictedly, and are a cause of great danger to forest areas which it is desired to save. It is therefore evident that only those areas which have been artificially isolated by fire lines and outward burning enjoy a sufficient legal protection. It is under these circumstances a noteworthy fact that in several localities a gradual change is taking place in the regular institution of firing the waste lands, especially where grass is valuable. The power of the general civil administration of the country is also year by year more actively directed towards the prevention of forest fires, and on the whole the progress made in this direction is sound and steady.

Annual statements are prepared which show the progress and cost of fire protection in the various provinces. They are very interesting and instructive, as showing the advances made year by year, but useless for comparison of the work in the various provinces, for it is very obvious that it is almost impossible to *correctly* compare the results of fire protection in any *two* forests even, the difficulties in the two being probably so very different—the length of the fire season varies, the number of dewless nights, the force of the wind, whether variable or constant, and the hours of the day or night that it blows ; the facilities for procuring assistance, the presence or absence of forest villages, the goodwill of neighbouring villagers, the existence of rights of grazing, of collecting minor produce ; the existence of main highways of traffic through or near the protected area ; the length of boundary and fire lines ; the way the lines run, whether along cultivation or along open forest, whether cut in forest or in the open, whether consisting of streams or ridges, roads or cut lines ; the scarcity of water, the dearness of provisions, the value of the labour obtainable, and many others which will occur to any Forest Officer. The return lately prescribed and submitted in abstract in the Annual Reports, analysing the origin of forest fires, is very useful, for

it shows at a glance where the chief dangers lie in each forest and thus facilitate their being met.

Some provinces, however, notably Burma, are still somewhat backward as regards fire protection. No doubt the difficulties in these localities are much greater than in others where we have been more successful, but my parting advice is to extend fire protection wherever feasible. Such extension, however, must be effective; the taking up of new areas beyond the power of the establishment to deal with often leads to the burning of a larger percentage than before and is worse than useless.

The annual cost of fire protection is at present a little above Rs.3,00,000, and amounts to less than 2 per cent of the gross revenue. There is no question that this rate of insurance is much too small, and I trust it will double itself before many years have elapsed; but we are handicapped by the amount of supervision we can afford for this important subject. As it is, the fire season is the most trying part of a Forester's life, from the Divisional Officer down to the lowest Fire Guard, and nobody who has not lived through it has any conception of the hardships it entails.

The work begins comparatively early in the season with the cutting of grass, herbs and bushes over miles upon miles of fire lines, and even at this early period the work has to be constantly inspected to see that it is thoroughly done. When this material has become dry enough to burn a most anxious and responsible time begins, for it has to be burned without causing damage to the neighbouring forests, chiefly at night when the dew has moistened the standing grass and when sparks can be more easily seen. This work becomes more and more dangerous as the season advances, and as the surrounding jungle gets drier and more inflammable. It is at night only that the work can be safely done, and night after night the fire gangs have to be at work. Then comes a short period of comparative ease, when the fire lines are finished and the surrounding country is not as yet ablaze. Soon, however, the sky is red at night with grass fires and fires in private and unprotected forests, and clouds of smoke wreath the horizon in the daytime. Now everybody has to be on the alert, the surrounding jungle has to be burned outward when fires from outside approach the fire-protected forests and the belt of safety is not sufficiently wide. In spite of every precaution, the fire is sometimes carried into a protected forest area by the wind and then a fight begins, and compartment after

compartment is defended till the fire has been got under. Such a fight is often very protracted, and what that means under the blazing sun of April and May, followed by a stifling night, can only be imagined by people who have lived in the tropic plains of India and can be realised only by actual experience."

In alluding to the evergreen forests Ribbentrop says that that type of forest had not suffered from the usual annual burning by the people. The evergreen species of tree are, as a fact, most sensitive to damage from fire, as they have not the resisting or recuperative power often possessed by deciduous trees. But they are less subject to firing, as evergreen forests tend to consolidate themselves, and there being no inflammable material in them they will not burn.

It is the high hot winds which usually prevail throughout the day and often into night in the hot season which add so much to the dangers and difficulties of fire-protection work. In the jungles of Northern India and Assam the dense masses of tall 18-40 feet elephant grass, which is extremely inflammable in its dry condition at this season, necessitates fire traces being made several hundred feet in width. These are carefully burnt on windless nights in the latter part of the cold weather as soon as the grass is dry enough to burn. But backed by an unusually high wind burning pieces of grass or blazing dry twigs are often blown across the line into the inflammable forests beyond, thus setting fire to the forest in several different spots at brief intervals. The same thing occurs in the case of broad rivers which ordinarily serve as an adequate protection. An instance of the latter occurred in the experience of the writer when in charge of the Tista Division in the Eastern Himalaya. Towards the end of April one year a wind of almost hurricane force blew dead across the upper reaches of the Tista River in the hills, and blazing sticks and grass from a fire which originated in a private forest on the other bank were blown across and started several fires which took several days and excessively hard work to get under. By the time the fires were stamped out we had an extraordinary concourse of hillmen at work, for all the passers-by on the road from the hills to the plains joined in the work, Nepalis, Thibetans, Lepchas and Bhutanese. And they worked amazingly well at a job which was not without danger. For in a hilly country unless the men are thoroughly acquainted with the topography there is a grave risk of getting cut off by the

fire, approaching uphill from below, getting round on the sides and then spreading out in some favourable slope above, thus encircling and cutting off the party who are attacking it below. In this instance a Ranger and four men were cut off in this manner, and but for the fact that a man posted as an outlying picket to give notice of new fires, and incidentally for this very purpose, giving a sufficiently timely warning, these men must have been burnt to death. As it was we managed to get them out all more or less badly burned, many of the rescuing party sharing the same fate. A thorough knowledge of the local topography is a *sine qua non* to successful fire work, combined with the exercise of a nice judgment of how far to go back to counter-fire. And however balanced this judgment may be the decision may be upset by a sudden increase in the strength of the wind. The root of all efficient fire conservancy is the Forest Officer himself. Whether a few hundred acres or a number of square miles of valuable forest are burnt on such occasions depends almost entirely on the resource and quickness of decision of the Forest Officer on the spot. The prevention of fires or their limitation is often also entirely due to the personal qualities, or influence, or powers of observation of the local officer. The following is an instance to the point. A small weaver bird constructs grass nests having the shape of a soda-water bottle, though often larger, the entrance being near the base. This nest is slung to a twig of a tree by a few slender grass threads. The bird loves to live in colonies, and you may find as many as twenty or more of these ingenious and beautiful nests hanging to the branches of a tree. A few years ago a Forest Officer, endowed with keen powers of observation, discovered the origin of many, up to then, unexplained fires in parts of the Assam Forests. A fire backed by a high wind would reach a broad boundary or fire-line which had been carefully cleared during the cold weather, and would be there checked and beaten out. Yet it was often found that fires started, as if by themselves, in parts of the forest beyond, without having crossed the trace. The following simple explanation was discovered. Colonies of this little weaver bird built their nests in small trees situated on the outer edge of the forest near the boundary-lines or fire traces. These nests were tenantless in the hot-weather season. As a fire came up with a strong wind behind it, the dried grass nests caught fire, the few strands by which they were attached to the trees were burned through at once, and the burning nests, acting as so many fireballs, were swept by the wind



THE KALMOI FIRE OBSERVATION STATION, SURAI FORESTS, BOMBAY.
NOTE THE OBSERVER'S POST IN THE TREE AND THE BIG DRUM BY
MEANS OF WHICH WARNING OF AN OUTBREAK OF FIRE IS SENT OUT.
THE NOTICES OF FIRE REGULATIONS ARE POSTED ON THE HUT
Reproduced from the "Indian Forester," Vol. XXVI

many hundred yards away into the forest on the far side of the carefully swept fire line, thus starting fresh fires. It is now the duty of the men who clear the fire lines in the cold-weather season to search for all adjacent weaver bird nests and cut them down and burn them.

From what has been written it may be well understood that the Forest Officer welcomes with a sigh of relief the first showers of rain which herald the burst of the monsoon in his district. For these showers see his fire lines covered almost in a night with a new growth of green grass shoots, the tinder-like condition of the forest gives place to a hot, moist, greenhouse temperature ; new growth of all kinds makes its appearance with incredible rapidity and the fire-protection season is at an end.

THE PROGRESS IN THE SETTLEMENT OF THE GRAZING QUESTION

It must not be thought that with the institution of Forest Conservancy in India there was any idea of excluding the enormous numbers of cattle, sheep and, worse still, goats which had from time immemorial grazed in the forests and waste lands at the will of their owners and free from any restrictions. Had the idea been entertained it would have proved impossible of achievement. The same state of affairs existed for many centuries in Europe and accounts for the bare slopes on precipitous mountains and hills in the Alps, Pyrenees, in Greece, Macedonia and elsewhere. But the damage had, in most cases, been done and the forests, and subsequently the flocks, had long disappeared before the advent of the scientific Forester in the west. In India when the Forester made his appearance the practice of cattle grazing in the forest was still in full force and regarded as indispensable. It is true that many fine forests had disappeared under the universal practice of grazing combined with fire, for the two were and are intimately associated ; but the country was very large and the population in many parts small. Consequently no diminution in the customary grazing methods had made its appearance. With the protection afforded the people under the settled British rule the herds and flocks had multiplied amazingly and the demands for grazing became intensified. It is a fact which scarcely needs insisting upon that the regeneration of a forest is difficult, in fact, impossible, if grazing animals are allowed within the area. True, some

species feed principally on grass and are not usually browsers, but when the former is absent they will feed on the young shoots of young trees, thereby destroying the latter from the point of view of their capacity to grow into commercial timber. Even when a forest is fully stocked with young and old growth it can only yield a certain amount of grazing; if, however, in a ruined or partially ruined state, grazing is incompatible with its restoration by means of a healthy crop of young trees. In India the position was rendered the more difficult since, owing to the large areas in question and from climatic reasons, usually the only possible method of re-stocking areas was by means of natural regeneration, i.e. from seed falling from the trees standing on the ground. And the difficulty was aggravated by the fact that the forests were mixed, areas containing a large number of associated species only a few of which had a commercial value, and these often the ones most difficult to naturally regenerate, or most liable to suffer from excessive grazing. On the other hand, in the sandy and desert regions where tree growth only occurred on the banks of rivers, and as far back as the percolation from the rivers reached, extensive grazing had been recognised by some native rulers, as e.g. in Sind, as impossible. It is true that the Amirs of Sind (*vide* I, p. 279) used these areas for hunting purposes, but they realised the fact that closure to grazing by fencing was necessary in order to obtain and maintain a forest growth on them.

These being the considerations which governed the policy with reference to the restriction of grazing it will be obvious that the question had to be handled with extreme care. It was imperative that the people should not be pressed too hardly, and a certain amount of grazing had to be provided within the forests which were formed into Government Reserves—usually to afford pasture to the flocks of the neighbouring villages or, a more difficult and troublesome problem, to milch cattle in order to provide the milk supply for some large city or town, community or garrison. This latter aspect of the grazing question was often the cause of much vexation of spirit to the Forest Officer, since the owners of these cattle were not his own district people with whom he was well acquainted, but a class apart who made a livelihood by this business; often a lawless set of individuals who abided by no rules or restrictions if they could by any means evade them, and spent their spare time in endeavouring to embroil the

Forest Officer with the other district officials. The supply of the milk required by the big hill station communities was ever a source of trouble to the Forest Officer through the opposition he experienced from these men. In such areas the supply of fuel and timber for the community was as important as the milk supply, and the necessity of closing a certain proportion of the blocks of forest against grazing imperative if the former object was to be maintained. But it was not always easy to persuade the Deputy Commissioner of the period here dealt with of the conflicting interests thus engendered. Perhaps the Darjiling Division offered as good an example of this form of grazing as any in India. The milk demand was very large and consequently a considerable herd of milk cattle had to be afforded grazing in the forests, for stall feeding to provide for this requirement on the lines of Europe was still condemned as impracticable in India. Every acre of forest in this district was of high value owing to the large demand for forestry produce to supply a big community. Extreme opposition was evinced by the cattle owners to the rules which necessitated a periodical change of the blocks grazed in and the total closure of others, perhaps in some cases the most convenient of access, which had reached their turn for regeneration. The necessity for changing at intervals the spots in which the cattle were penned at night, owing to the fact that with the loose shaly soil of this locality they became churned up into a mass of mud and filth which reduced these areas to unplatable bogs and contaminated the milk supply, also gave rise to wrath and open acts of aggression by the cattle men, and intimidation of the forest staff. This latter point was settled by the paving, at a considerable outlay, of the spots in the forests at which it was most convenient to pen the animals at nights. The author was in charge of the division whilst these matters were receiving consideration, and thus writes at first hand of the difficulties experienced at that time, difficulties which the enlightened views of the Deputy Commissioner, Mr. (later Sir A.) Earle, did much to alleviate. Another common trouble the Forest Officer had to face was the annual influx of a floating population of graziers with large herds of cattle which burdened the forests with far more animals than it could provide grazing for. This has already been alluded to on p. 527.

To go back—with the constitution of the Government Reserves the first question to be settled was the kind and

number of cattle which had access to each reserve by right of the areas having been used for grazing from time immemorial. In some cases it was found that this number was excessive if the forests were to be improved, and in others, owing to the paucity of the population, the question had little importance at the time. But it was in the densely populated parts of the country where the herds of cattle were the largest, and the area of forests was the smallest, and its value to the community the greatest. In the Kulu settlement of the Punjab, for instance, the total of the cattle grazing by night within the reserves largely exceeded the number of cattle kept in the valley, but the same animals figured for different blocks.

It was laid down by Government that if the extension of the Forest Reserves in any part of the country, as they became gradually demarcated and gazetted under the Act, absorbed too large a proportion of what had been customary grazing grounds of the country, the Reserves must be made to yield grazing as well as timber and other materials. The Forest Officer, whatever his own private opinion, had accordingly to arrange to give force to the order, although in some provinces unwise attempts were at first made to entirely close all forest reserves. The Forest Officer was aware that as long as the order remained he would be unable to bring his forests to that state of perfection which would be otherwise achievable; also that the restoration of ruined forests would take very much longer, owing to the less rapid rate at which he could regenerate his different blocks, since closure was only possible in turn, and would probably never be as satisfactorily or completely achieved, owing to the period it would be possible to maintain the closure being too short.

In some parts of the country the grazing question gave little trouble. Here grass was in greater demand than wood, fires being, over a wide extent of country, needed for cooking purposes only; for this latter purpose dried cow-dung was used and preferred. But, generally speaking, throughout the country it may be said that grass was a commodity largely in demand, and the working of the forests had to be framed to ensure this requirement being met.

When the management of some forest areas became advanced enough the first working plans were drawn up for them, but these and their successors elsewhere have invariably been framed in accordance with the grazing requirements of the particular locality. In dealing with the gradual settle-

ment of the grazing question, so far as it had proceeded by 1900, for vexed questions remained in several provinces, and especially in Bombay, Ribbentrop says :

“ The periodical opening and closing of blocks of forests are arranged for under working plans duly submitted for criticism and sanctioned by Government, and the requirements of the people and the most necessary protection the forest growth needs are duly weighed and balanced. Where no working plans exist as yet, the closing is arranged for under annual plans of operations. This is the only correct solution of the question, and great harm has been done by regulating the grazing in forest areas by general prescriptions and rules, instead of treating each forest on its own merits. Any such action robs the forest management of the necessary elasticity, without benefiting the public. It is in the interests of the State to utilise its forest property to the utmost of its potential capabilities, which cannot, it is clear, be increased by prescriptions and records of undefined privileges, but which can be lowered past recovery by excessive use. Such records permitting privileges beyond the capabilities of the forest are only too frequently the consequence of the desire to secure the utmost benefit to the surrounding population, though in the end they effect the opposite. Larger temporary benefits can naturally be conferred if the capital is drawn on as well as the interest. The feeling that non-interference on the part of forest officials with grazing should be secured to the people in Government forest property, is no doubt to some extent due to a reaction against the entire closing of forest areas made over to the charge of the Forest Department, which was originally attempted in some provinces.

This step was an unwise one. Of course it cannot be denied that grazing is hurtful to forest reproduction, and that the damage done is only a matter of degree, and that more especially regeneration is quite incompatible with the grazing of goats and other browsers.” (It may be added that much damage is done by the mere weight of large animals, such as buffaloes, in moving about in young growth.) “ It is also beyond question that incalculable harm, and frequently almost incurable damage, has been done by excessive grazing, especially of goats, in the lower hills, from which small streams and rivulets debouch direct on culturable lands below. Owing to the peculiarly friable nature of the sand-

stone formation of the *chos* in the Punjab, the damage done in that instance is specially pronounced, and thousands upon thousands of acres of fertile lands have been covered by sterile sand, owing to an unchecked grazing of goats and other animals. This is an extreme case, but the utterly barren condition and corrugated appearance of a large proportion of the hills in the Deccan, in many places in Madras and elsewhere, owe their origin to excessive grazing. The danger to which the canal works in the Saharanpur District are exposed is due to excessive grazing in the lower reaches of the 'raus' (streams) of the Siwaliks.

Quite apart from the forest question, it is clear that the present way of dealing with these areas is wasteful from a fodder point of view, and more especially leaves no reserve in case of scarcity or fodder famine. The formation of fodder and grass reserves to obviate those consequences was proposed some years ago. In my opinion no better reserves of this kind can exist than forest reserves, managed under working plans framed with the purpose desired in view.

Large areas in the drier regions of India, especially in the *bars* of the southern part of the Punjab, are *bona fide* grazing grounds, and must always be treated as such in order to obtain the greatest possible yield. The maintenance of the wood crops in these regions is a secondary question. Such forests are closed against grazing for a few years after a wood crop has been gathered. But even here the exclusion of goats and camels has shown the most beneficial result. A failure of the rains in these dry districts is at once followed by scarcity, and, if it continues for a few years, by distress.

In the Central Provinces, also, the income derived from grazing in forest reserves forms a large portion of the forest revenue, and here it is found that the exclusion from grazing without resorting to fire protecting at the same time serves no practical end, for, though reproduction takes place, a dense crop of grass almost immediately covers the ground; and conflagrations, which are the order of the day, sweep everything cleaner than it was before.

The aggregate and percentage of forest areas, both permanently and periodically closed, have constantly increased, and amounted by the end of 1897-8 to 33,738 square miles closed against all animals, and 28,146 square miles closed to browsers in addition.

It must, however, be understood that nearly two-thirds of

the former area are represented by continuous forest tracts, chiefly in Burma, Bengal and Assam, and some other provinces in which there is no demand for grazing ; and that no areas are closed, whether permanently or otherwise, without a deliberate and full consideration of the actual requirements of the people in the matter of grazing."

There is another point not touched upon by Ribbentrop which deserves mention. This is the usefulness of scrub forests in the drier parts of the country to provide fodder for the cattle in periods of famine. Ajmere serves as a striking illustration. In a hot climate, except in districts with an exceedingly heavy rainfall, a better crop of grass is produced under the shade of trees than in the open, and this is particularly the case in seasons of drought. In the dry climate of Rajputana numerous chiefs and princes had from time immemorial established game preserves, chiefly as cover for pig (wild boar). The forest growth in these preserves was carefully protected, and during the terrible famine which devastated the country in 1867-9 they furnished quantities of grass and branches of trees to feed the cattle of the neighbouring towns and villages. Two small British districts, Ajmere and Merwara, are situated in the middle of these native states of Rajputana. The whole of the waste and forest lands of these districts belonging to the Government were handed over to the villagers at the settlement of 1850, the Government relinquishing all their rights in the lands. The results were disastrous. The hills were denuded of timber which was sold or wastefully utilised, with the result that the areas became barren and unproductive. The people of this country depend on irrigation water to irrigate their crops. This water is furnished by numerous tanks (ponds) formed by throwing embankments across valleys at convenient points. Many of these were very old ; others had been built by the British. The rainfall is scanty and falls irregularly in a few heavy showers. After the hill-sides were denuded the rainfall rushed down them in torrents, eroding the hill-sides, rapidly filling the tanks and bursting the embankments or filling up the tanks with silt and debris. Brandis visited these districts in 1869 at the end of the diastrous famine years. He paints a vivid picture of what he saw :

" The cattle had perished, the people had fled, large villages were entirely deserted, and the country was almost depopulated by these

years of drought and famine. Adjoining the district of Merwara on the east side is the territory of the Thakur of Bednor, a feudatory to the Maharajah of Udaipur, and the contrast was extremely surprising—in British territory the hills denuded, in Bednor the hills wooded, the forest having been carefully protected. From the top of Bairat Hill on January 2nd, 1870, we looked down upon the town with its large tank and beautiful groves of fruit trees, and here the Thakur's eldest son, who had the management of the forest lands, told me how the Nasirabad charcoal contractors had come, offering large sums if he would allow them to cut. He had refused, and would always refuse their request, knowing well that the grass in the forest and the branches of the trees had saved the cattle of Bednor in seasons of drought, and that the water supply in the tanks, upon which the fertility of the country depended, was maintained by the forest growth on the hills.

After several years' hesitation, action was at last taken in 1874 to remedy the mistakes which, with the best intentions, had been made in 1850. The Ajmere Forest regulation was passed which gave the Chief Commissioner of those districts power to take up any tract of waste or hilly land as a State forest, granting the people who had formerly had an interest in that land the right of cutting grass and wood in it for their own requirements and a liberal share in the net proceeds from the management of these lands. This measure, at first sight, might be termed a confiscation of rights deliberately granted. In reality, however, the proprietary rights had at the settlement not been granted to individuals, but to the village communities. They were communal lands, and as such public, not private, property. Government, therefore, as the guardian of all public interests, had the duty to interfere. This small measure, had it been properly followed up, might have been one of the most beneficial measures passed in the reign of Lord Northbrook. Unfortunately, only 139 square miles, or 5 per cent of the total area, have been demarcated as State forest in Ajmere-Merwara. And worse than this, grazing was frequently allowed without real necessity, and consequently protection remained incomplete. Nevertheless, with all these drawbacks, these reserves are now very fairly stocked with trees and shrubs, and they have proved a great protection to these districts in times of drought during the last twenty years.

In the famine, which affected a large portion of the Bombay Presidency in consequence of the short monsoon of 1896, operations were undertaken on a large scale to provide cattle fodder from the forests to all districts which needed such help. Mr. Allan Shuttleworth, the Conservator of forests, organised and directed these operations. Presses were set up near the forests, roads were constructed, hay was made and pressed in 80-lb. bales which were despatched by train, and were sold at cost price at depots all over

the affected districts. The same plan was pursued in the late famine, and has also been adopted in other provinces. Grain can easily be sent to districts affected by scarcity, the provision of cattle fodder is more difficult, and in previous famines the loss of cattle has always been the chief calamity. When at last rain falls and no cattle are left to plough, the distress is terrible. Millions of cattle have been saved by these measures, and it is to be hoped that the ruling authorities in India will always bear in mind that if in seasons of drought the forests are to be in a position to furnish cattle fodder on a large scale, they must in ordinary years be efficiently protected against fire and must not be indiscriminately opened to cattle."

Generally speaking it may be allowed that a vast improvement and better understanding of this question had become evident in many parts of India by the close of the century. But some provinces were still very backward. In Bombay the authorities were still sceptical as to the results which could be obtained by closing areas to grazing. The author remembers the senior Bombay Conservator (Mr. Wroughton, later Inspector-General of Forests) showing him two small areas he had obtained permission to enclose in the neighbourhood of Poona, with the object of proving to the Governor that mere closure by fencing of an apparently barren area to keep out grazing animals would result in the area becoming clothed with a shrubby growth which would be utilisable as firewood. This was in 1901, and the result attained fulfilled the Conservator's prophecy. Bombay was extraordinarily backward in dealing with this grazing question.

THE EFFECTS OF PROTECTION ON EROSION OF HILL-SIDES

In previous parts of this history (I, Chap. XI) the effect of the destruction of the forests which took place during the first half of the nineteenth century has been reviewed.

It has also been indicated that a considerable period of years elapsed before the Government came to a full realisation of the fact that the unchecked hacking of the forests, coupled with fire and unrestricted grazing, had resultant effects in hilly countries even more serious than the mere disappearance of forests subjected to this use. That following such treatment erosion commenced in the hill-sides which eventually ruined the valuable agricultural lands at their foot.

By the end of the period here under review the local influence

of well-stocked forests in India had become known to intelligent persons living in the country. It was recognised that they afforded shelter to crops and stock, and to man against the scorching winds of the hot-weather season, and, though less well known perhaps, that the dew was heavier in their vicinity. Of even greater importance is the effect of properly conserved forests in regulating the surface drainage, in maintaining an even water supply, in springs and streams, in preventing the denudation of hill-sides, the silting up of rivers and the destruction of arable land in the plains by sand, silt and stones washed down from the hills.

Gibson (Bombay) and Cleghorn (Madras) may be said to have been the two first Forest Officers who made careful studies of the results in this connection of the destruction of the teak forests in their Presidencies during the first half of the century. Brandis and Ribbentrop ably carried on this investigation during the second half, and tabulated much information, based on proof, of great value.

To quote two well-known instances : The Ratnagiri District, on the west coast south of Bombay, has a rainfall of between 100 and 150 inches a year. Yet, owing to the former destruction of the forests, in 1900 this district was almost bare to the crests of the gháts, the result of fires, grazing and shifting cultivation. The four principal streams, rising in the ghát mountains with a short course to the sea, were all formerly navigable, and were of importance to the commerce of the country. At the close of the century the streams had silted up to such an extent that navigation was only possible for boats of shallow draught, owing to the catchment areas of these rivers having been denuded. Again, in the Hoshiarpur District of the Punjab, the Siwalik range of hills stretches from the Beas to the Sutlej River in a south-easterly direction. These hills consist of a very friable sandstone, alternating with strata of loam and clay. Formerly these hills were fairly well wooded. In 1846 they became British territory ; with the rapid increase in population which followed, a great demand for wood and charcoal ensued for the requirements of the population of the fertile plains below, whilst the hills were invaded by a considerable population of graziers with large herds of cattle. The result was complete denudation of the hills ; the loose soil, no longer protected by vegetation, was washed down, broad stretches of sand invaded the plains beneath, with the consequence that the arable lands of 940

once prosperous villages were covered with sand which laid waste upwards of 70,000 acres of fertile lands. By 1900 this formerly rich district was traversed by numerous broad, parallel, sandy belts, cut out of the fertile and crop-bearing area. Proofs of the advantages accruing from the strict protection of areas where erosion had resulted in annually increasing damage, with its many attendant consequences, were not therefore absent by the close of the century. In almost every instance protection from fire was almost immediately followed by the growth of a dense vegetation which soon checked erosion and reduced the danger of landslips and sudden floods; the beds of streams debouching from fire-protected areas soon began to contract in width and flow in narrower and better defined channels. Ribbentrop gives a number of other illustrations of the beneficial results obtained.

"A streamlet, the Mendikola, runs through the Mohwa Bir Reserve in Ajmere. A few years ago it was thirty feet wide where it leaves the forest block, but since the catchment area has been protected against fire the watercourse had gradually been confined to a distinct deep, narrow channel. Further below, where it is joined by small streams draining unprotected areas, the bed has maintained its original character. In the Central Provinces the smaller streams draining the Ahiri Forests, which were broad and rugged water channels, have, since the forests were protected from fires, entirely silted up, all but a narrow bed, and form part of the forest grown over with reproduction. The Sipna River (Bairagah Reserve, Berar), with its tributaries, which are crossed by the Ellichpur-Pili road, affords also a good example of the effect of fire conservancy in reducing floods, erosion, etc. Watercourses in the Siwaliks, between the Dehra Dun and the plains, have contracted to half, and even one-third, of their breadth under the influence of fire protection. Many have entirely filled up and exist now only as gentle, partly overgrown depressions."

In 1899 Ribbentrop conducted Sir Thomas Holderness, G.C.B., lately Permanent Under-Secretary at the India Office and at the time Revenue Secretary to the Government of India, over this latter area. Throughout his long connection with Indian Administration Sir Thomas maintained a keen interest in and knowledge of forestry matters, and was responsible in no small degree for the progress of the Depart-

ment. That his interest was of the practical kind the present instance records. Ribbentrop pointed out to him the results of fire protection in the forests clothing the Siwalik Hills, showing him many channels, surveyed and mapped as late as 1876, which had now ceased to exist, being overgrown by bushes and young sál reproduction. In the case of the Ratamau basin, the sides and slopes of the hills were clothed with grass and young seedlings, and the water no longer rushed down carrying silt with it; the floods in the *raus* (streams) had as a result become reduced in volume and force, the water channels had become narrower and deeper, and the old beds were overgrown with grass and thousands of sissu (*Dalbergia Sissoo*) and khair (*Acacia Catechu*) seedlings. The little silt washed down was caught by the grass tufts, resulting in the elevation of banks in the stream's bed and the deepening and constricting of the water channels.

On the outer Siwaliks also fire protection had had the most beneficial results, and the upper courses of all *raus*, especially the Dholkhand *rau*, have been confined into permanent beds, and the smaller torrents which existed but a few years ago have filled up and to a great extent already form part of the new forest springing up. That on this side of the Siwaliks no adequate effect at the end of this period had yet been experienced in diminishing the freshets, which endangered the canal works, was due to the excessive grazing which still continued in the lower reaches.

Examples of this nature could be multiplied, and every Forest Officer at this period could have quoted object-lessons of the value of protection in his own charge which would have formed indisputable evidence.

The influence of continued protection on the continuity and supply of water in springs, tanks (ponds) and wells showed the most divergent results. In some places a continuity and regular supply of water followed protective measures, whereas in others an immediate decrease of the water supply took place. These phenomena had been foreseen. In the case of the tank, for instance, where the maintenance of the water level depended upon a rapid flow into it, which resulted from rain water falling upon and rapidly running off a bare piece of ground, a covering of vegetation on the area naturally interfered with this rapid flow. The tank had been built to replace the dried-up streams and springs formerly existing on the area when it was covered with vegetation. These streams provided, naturally,

moisture to the area which now had to be irrigated by raising the water from the tank by the labour of man and distributing it over the land. In the case of protective measures introduced with the object of restoring the natural water supplies, time is required before the sub-surface flow of water can regain its proper level, and the experiments made up to this time were still too recent to afford reliable results. Ribbentrop mentions, however, that water had already been found near the fire-protected Danta Reserve in Ajmere at a depth of fifteen feet, whereas under very similar conditions as regards rock, stratification and soil, but where the hill-sides were bare of vegetation, water was not reached under a depth of twenty-five feet.

During the next twenty years further definite evidence became available from the records of the Department on this subject, which will be treated of at a later stage in this history, as also the work which was commenced with the object of replanting some of these areas.

PROGRESS IN THE PROTECTION OF THE FORESTS FROM PESTS

With the very large amount of preliminary work to be carried through which faced the Department in its initiatory years, and in the absence at first of a trained staff and subsequently the comparative weakness in numbers of the trained staff, it is a matter of little surprise that but small progress should have been made during the period in the study of the pests—insect and plant—which affected the growth of the trees or depreciated the value or quantity of the timber and other marketable commodities of the forests. The preliminary work facing a new Department, the exploration of the forests, demarcation and survey, protection from fire, the regulation of grazing, opening out of communications, erection of buildings, and the exploitation of the marketable crops, often during the period done by departmental agency, occupied to the full the whole-time energies of the officers. Scant leisure was afforded them for carrying out the study even of the silvicultural characteristics of the species they were dealing with. The diseases to which the trees were subject had to be left to a future time.

Insect Pests.—It is an interesting fact worthy of mention that enquiries on the subject of one insect pest, to which the name "Bee-hole borer" of teak had been given, were instituted

many years before. In consignments of teak "squares" sent home to the Admiralty it had been at times found that on cutting up the squares in the mills the planks were found to contain elongated holes and blemishes which entirely ruined the timber for the purposes for which it was required. In his Report on the Teak Forests of Tenasserim, Dr. Falconer made the following allusions to this matter in 1851: "The mixture of this light dead timber with unseasoned logs which have been felled green, and logs flawed with holes and clefts from the Thaungyin in the shipments made to England, is generally considered to have been the cause of the bad repute into which the Tenasserim teak has fallen at home for shipbuilding. . . . The two latter circumstances had more to do with the result than the first." . . . "The tree during its growth does not seem to suffer much from the ravages of parasitical insects. Captain Tremenhoe mentions that the stem is attacked by a beetle in the Thaungyin which bores teredo-like holes. I observed no marks of such an insect in the Attaran Forests." Captain Guthrie, in a Report on the Tenasserim Forests in 1845, says: "Of the Thaungyin teak I may remark that I have seen it growing and thriving in every variety of locality; it has generally the advantage of carrying its girth well to a great height, not tapering quickly; it appears to be somewhat liable to small cells, isolated, but which appear in the sawing up." Thus even in those early times an insect was known to be causing a serious loss in the teak forests. It was not a beetle nor a bee as events proved, but the destructive agent still remained an enigma at the end of the century.

Ramsay also reported the presence of borers which had not been as yet identified in girdled sâl in the North-West Provinces and Oudh sâl forests. The systematic study of the fauna, especially the insects, in its relation to the damage committed in the forest, had not commenced. The scattered investigations and notes which had from time to time been recorded by observant Forest Officers were either published in the pages of the *Indian Forester*, entered in Divisional office or Range office diaries, from whose pages they rarely emerged, or were forwarded to the Indian Museum, Calcutta, when they appeared in *Indian Museum Notes*. Amongst the most interesting of the earliest recorded investigations of this nature, which appeared in the pages of the *Indian Forester*, were Mr. A. G. Mein's account of the "Kulsi Teak Borer" (*Stromatium*

barbatum) which appeared in the *Indian Forester*, Vol. IV (1879), and reports of the teak defoliating caterpillars, *Hyblaea puera* and *Paliga damastesalis*, from Burma and elsewhere in India, by J. N. (1884) and others. The interesting series, *Indian Museum Notes*, was commenced in 1889 by Mr. E. C. Cotes of the Indian Museum and published by the Trustees. It dealt with economic entomology generally, and recorded such investigations as were sent to Mr. Cotes by Forest Officers, the former obtaining identification of the insects where possible. This question is dealt with in a later chapter.

Creepers.—Amongst plant pests, the creepers which infest the forests of India require a mention. In former parts reference has been made to the first protective work undertaken by the newly organised staff of the Department. This was the obvious necessity of clearing the trees from the giant creepers with which they abounded. It has been shown that in the Oudh forests this work was prosecuted on a systematic scale by the Conservator and his Assistants (p. 354), and references are numerous in the correspondence of the period to the thorough manner in which this campaign was carried out, and to the fact that funds were provided for the purpose. With the introduction of working plans, creeper cutting was laid down as an important operation to be effected in the "coupes," and was undertaken in the areas to be felled a year before the felling was to take place.

Fungous Pests.—If but little advance had been made in the study of the insect pests of the forests, the fungi of the forests and the damage committed by them remained a sealed book at the close of the century. The dry climate during the greater part of the year and the excessive flooding during the monsoon were not favourable to the growth of fungi in the plains part of the country. But the conditions were otherwise in the Lower Himalayan forests and in those of the hilly regions in other parts of India, and experts considered it probable that in these areas pests existed whose study would eventually prove of importance in the management of the forests. That the study of the fungi is a necessary branch of forest science need scarcely be commented upon. The work of German mycologists has sufficiently emphasised the fact. Their work however, it was considered, could only be drawn upon to a slight extent for practical application in India. Even when the parasites proved identical the trees on which they lived would be different, and consequently their mode of action would differ

with different pests. It was held, however, to be probable that the majority of the Indian forest fungus parasites would prove entirely different from those of Europe and America, and the fact that the existence of a large number of new forms had not been brought to light furnished evidence of the absence of definite knowledge of the subject.

CHAPTER XVIII

THE FORMATION OF PLANTATIONS AND THE IMPROVEMENT OF THE FOREST CROPS, 1871-1900

A VERY considerable correspondence had taken place through several decades on the subject of forming plantations, and a beginning had also been made in certain provinces with the object of improving the conditions of the more or less destroyed forests. The work accomplished in these directions will be now reviewed.

THE FORMATION OF PLANTATIONS

It will have been recognised, from the accounts given of the accelerated exploitation of the forests which took place after the establishment of British rule in India to provide for the construction of public works, military needs, and the requirements of the Admiralty, that the idea was held that the destroyed forests could best be replaced by the formation of plantations. Quite early in the nineteenth century this idea took shape and was given effect to, at first without success, in Madras. Conolly, Collector of Malabar, strongly advocated this measure, though he only regarded it from the point of view of making provision for the future needs of Government in teak timber. He was able to give practical shape to his views by commencing the teak plantations which bear his name. These, as has been shown, were successful almost from the start. Gibson in Bombay and Tremenhare in Tenasserim commenced the formation of teak plantations, in neither case with much success. In Burma the plantation idea to replace the cut-out teak areas was strongly supported by Falconer, although he also recommended, as had Wallich, the restoration of the teak by sowing teak seed broadcast through the cut-out forests. This latter method does not come within the province of plantations proper. At a later stage Cleghorn advised the formation of plantations in Madras, firstly to supply fuel for Madras city, for which the

Casuarina was being tentatively used with good results to plant up the sandy land adjacent to the seaboard; and secondly, to provide for the fuel supply of Ootacamund and Wellington. For this latter purpose eucalyptus and wattle and an acacia were employed also with striking success almost from the beginning. In the north the heavy fellings made in the deodar forests of the Punjab Himalaya had resulted in orders being issued that plantation work was to be undertaken in suitable areas near the rivers, with the object of maintaining the future supplies of this valuable species. The question of forming plantations with the object of adding to the fuel supplies was considered in the case of Simla by both Cleghorn and Falconer. In the plains the question became acute with the advent of the railways, and a great deal of consideration was given to this aspect of forest work by Brandis, Stewart and others. In the decade following the Mutiny we find this plantation question forming the subject of many despatches between the Secretary of State and the Government of India, the provision of fuel for the railways now being rapidly constructed in Madras, Bombay, the Punjab and the North-West Provinces being an imperative necessity. The Secretary of State made it clear that the railways were not to be given preferential treatment in prices at the expense of the local inhabitants, but that every effort should be made to take up land and form plantations to supply the fuel requirements of these localities and the several railways, wherever these latter could not be met by reserving sufficiently large areas of waste land containing scrub forest of sufficient growth to provide fuel.

In the Central Provinces also the work of forming teak plantations in selected sites had been commenced, two Scots Foresters having been obtained from home for the purpose. In Bengal the first plantation commenced was the cinchona plantation in the Darjiling Hills. This was under the direction of the Director of the Calcutta Botanic Gardens (Anderson), and efforts were made to start similar ones in Madras and Burma. But Anderson also laid out a forest nursery in the neighbourhood of Darjiling with the object of forming plantations therefrom.

Amongst exotic species which were being introduced into India were mahogany, Australian species of eucalyptus and wattle, the maritime pine and larch.

It is of course an accepted fact that plantations are the most effective and rapid means of insuring the regeneration of an

exploited forest or to change its character to a *more valuable* one. But it is equally obvious that the cost of sowing and planting must limit the extension of such operations to localities favourably situated as regards soil, situation and markets. In such cases plantation work is justified and should pay. But to imagine, as it had been imagined for a long period of years, that the devastated forests could be replaced by plantations in so large a country as India with its rapidly increasing population and growing requirements in forest produce was a fallacy. Brandis was probably the first to realise the position and to perceive that the formation of plantations for many years to come must be made subservient to the great work of restoring the forests to something like normality by sylvicultural means as against arboricultural ones. That plantation work should at first be limited to denuded areas which it was imperative to re-stock, or to the introduction of species on to areas where they did not at the time exist.

This briefly was the position in 1870, with one exception. Teak plantation work had not proved a success in Burma at the time of the arrival there of Brandis. In 1856 he conceived the idea of making use of the *toungya* (shifting cultivation) system, in practice amongst the Karens, for the purpose of establishing teak plantations by persuading the men to inter-plant teak with the last crop of grain sown. As already described, the cultivator under this system vacated the area after raising two or three crops on it. Brandis' idea was to grant areas of forest suitable for teak to these men free, and thus obtain a crop of teak on the area at their departure. This system will be referred to again later.

The prevailing idea in the minds of the authorities on the subject of the future of plantations gave place, therefore, with the advent and progress of the Department, to the more practical one of improving the existing though devastated forests throughout the country. It is for this reason that, in comparison to the great area of forest under the control of the Department at the close of the century, the area of artificial plantations was insignificant. This does not mean that there were not areas throughout the country where such work was in crying need of being undertaken. There were many such. But, with the great amount of work with which it was coping, the Department had neither the staff, and therefore the time, nor the money to devote to this work.

The area of plantations recorded as successful amounted in

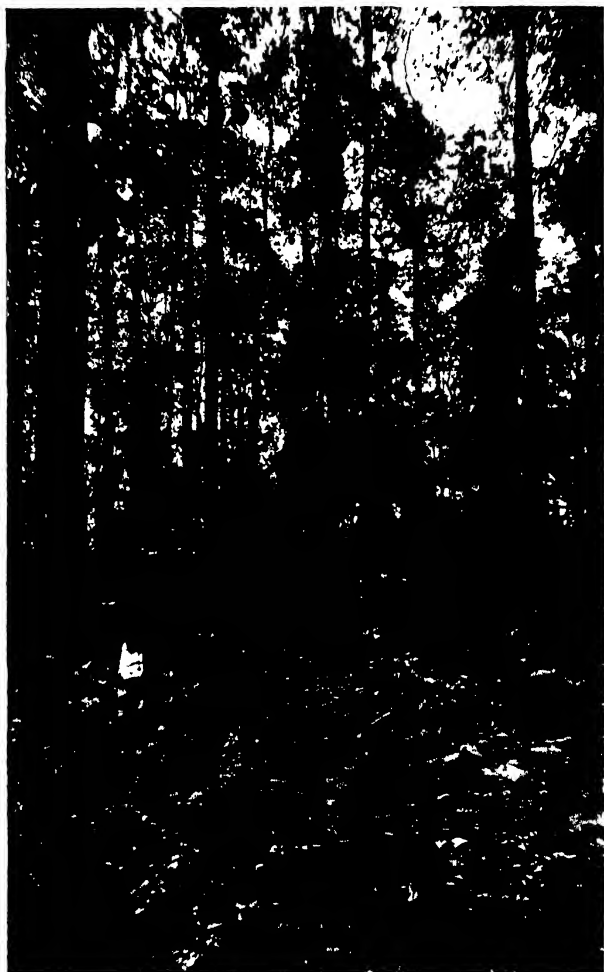
1900 in round figures to 100,000 acres, of which 68,000 were in the Bengal Presidency, 20,000 in Madras and 12,000 in Bombay. These figures are not, unfortunately, complete. They do not, and rightly, include artificial measures which had from time to time been taken in different parts of the country to complete and improve the regeneration in natural forests. In Bombay, however, it was said that they might include certain cheap cultural operations designed for this purpose, and this would accordingly diminish the area of pure plantations given above for this Presidency. The figures, however, excluded areas which had been sown and planted—plantations in fact—but which had not proved sufficiently successful to be classed as regular plantations, though in many instances they were held to show a decided improvement on the original forest growth. Failures were also excluded. These exclusions vitiate the return, because it is well recognised amongst present-day foresters that there is as much, very often, to be learnt from a partial or direct failure as from a success; and in any event the financial success of plantation work as a whole can only be judged by adding the cost of the failures to that of the successes.

A brief review of the plantation work carried out in the different provinces will prove of interest.

The Nilumbur teak plantations were the first, as they have proved the most uniformly successful, in this class of work. The oldest of these were nearly sixty years of age at the end of the century and were at the time expected to be mature by 1930 to 1935. By 1900 an area of about 4200 acres had been planted. This area was not everywhere equally well stocked.

In some instances the selection of areas of unsuitable soil had resulted in a partial failure. The growth was considered to be remarkable on almost half the planted area, and the development was satisfactory on an additional 1800 acres. Up to 1894 about Rs.10,50,000 had been spent on the plantation, but by that time the revenue realised had already equalled the total expenditure. Ribbentrop gave the following anticipated forecast of the financial results of this work :

“ The gross revenue to be realised during the ten years ending in 1905 has been estimated in excess of Rs.6,50,000. During this period the expenditure may still be estimated at 50 per cent of the gross income, but this percentage will diminish year by year as the income increases. A forecast has been made



THE NILUMBUR TEAK PLANTATIONS, MADRAS. A PLANTATION ABOUT
50 YEARS OLD (CF. WITH PLATE FACING P. 07, VOL. I.)

Photograph by A. B. Jackson
Reproduced from "Indian Forester," Vol. XXVI

that when the plantation becomes mature, at the age of ninety-five, the annual income will reach upwards of half a million rupees. This estimate may probably be somewhat excessive, but the plantation is admirably situated for export, on the banks of a most perfect floating stream, and the timber is but little less valuable in the forest than in the depot."

The second type of successful plantation work in Madras is exemplified by the casuarina plantations formed on the sandy tracts along the east coast. This work, as has been shown, had commenced in Cleghorn's time. As soon as it had become demonstrated that these plantations, owing to their rapid growth and the comparative ease with which they were formed, were a paying investment, numerous private persons commenced to undertake the work, with the result that by 1900 extensive areas of casuarina forests were to be seen stretching from the neighbourhood of Ganjam in the north, to the south of Madras city. This species was propagated with fair ease, and at ten years of age a plantation was estimated to yield 40 tons per acre and a net return of about Rs.38 per acre.

The other main type of plantation which proved an indisputable success was the plantations of eucalyptus, which were formed in the neighbourhood of Ootacamund in order to produce supplies of timber and fuel for this growing hill station. Although not actually originated by him the name of Mr. (later Sir) D. E. Hutchins will be for ever associated with this successful work. The first attempts to plant eucalyptus at Ootacamund were made by Captain Cotton in 1843. He was followed by General Morgan in 1856. The first Government plantation was made by Hutchins in 1862. By the end of the century there were very large areas of these plantations owned by both Government and private persons on the Nilgiris and the other hill ranges of South India and on the mountains of Ceylon. They furnished a cheap fuel and some building timber.

The other plantations in Madras, as well as most of those in Bombay, consisted of numerous small blocks either worked by the Department or owned privately; for arboriculture in India by the end of the century was not confined to the work and efforts of the Forest Department.

In Burma the plantation work was a failure up to the arrival of Brandis in that Province. Some valuable teak plantations existed in Burma at the close of the century, viz. at Magayee,

Kyetpaung, Bohenchounga, Kywemaking, Pyunchaung and Prome, aggregating in all some 3668 acres. Some parts of these dated back to 1857, the time when Brandis began his work in Burma. Some of the plantations made at this period failed owing to the areas having been selected primarily for their proximity to markets (e.g. Kyetpaung) and not for their soil—the paramount requirement. Over 75 per cent were said to have been established on good soil, and the growth was considered to be as good as the average growth at Nilumbur, omitting the best of the latter. The Burma plantations had proved expensive. As we have shown, they were started in Brandis' time and were continued after he left. But the work was gradually curtailed and had been almost abandoned by 1900. This was due to Brandis himself; for, when he had acquired an acquaintance with the country and its methods he approached the matter from a totally different angle from the ordinary preconceived notions. He grasped the impossibility of accomplishing anything at all commensurate with the needs of the Province by the ordinarily accepted methods, and issued orders that the taungya system in force in so many of the forests should be utilised to the future benefit of the areas which were first destroyed by it.

The development of the taungya system which, as will be shown in later parts of this history, has since spread to India and will inevitably be applied to extensive areas of the forests in other parts of our Empire, is almost a romance. It is well told by Ribbentrop, who had an extensive knowledge of Burma, where he served for some years, in *Forestry in British India*, and his description could not be improved:

"A Burmese Forester, Oo Tsan Dun, in charge of the Kabaung Forest at the time, was the first who gave practical effect to the orders issued on the subject, and for some years continued to plant teak in the *taungyas* he cut and cultivated with paddy and cotton. The plantations thus formed were small, but the results were excellent, and the scheme was followed up, on a somewhat extended scale, by Mr. Graham, for some time Deputy Conservator of Forests in charge of the Toungoo Division. In 1868, however, the area thus cultivated amounted to less than 100 acres. It was at this time contemplated to extend this method of cultivation to 350 acres per annum at a cost of Rs.30 per acre during the first five years. However, for some years hardly any progress was made in the extension of teak *taungyas*, and by the end of 1872-3 the total area thus cultivated amounted only to some 250 acres. In 1873-4, the then Conservator, Major Seaton, entered into agreements with



A Gmel GUM (*Gmelina arborea*) PLANTATION IN THE NIGERIEN,
AGE 30 YEARS, AVERAGE HEIGHT 143 METERS
From Research Institute Collections, Dakar, Senegal

many of the Karens in Tharrawaddy and Prome, and induced them to plant by the promise of definite *taungya* grounds. The result was that some 250 acres were planted in that year, and upwards of 300 in the following. In 1875-6 the area planted had risen to about 1050 acres. It was evident that the method of cultivation must be restricted to reserves and areas which could be effectually fire protected. This for some years curtailed the expansion, and by the end of 1879-80 only about 2500 acres had been planted out. By this time, however, reservation had been considerably extended, and the population had become accustomed to the employment thus offered, which gave them a regular income, in addition to the crops which they were able to raise just as in former times; and it became possible to work over larger areas, and at the same time to command better average results. Even the uncivilised Karens had become aware that we were conferring a favour rather than seeking one, which had been their feeling at the outset. We also employ these men in girdling, timber works and other forest operations, and the disbursement of several lakhs of rupees per annum have transformed these tribes, who in former times hardly ever earned any money, from an antagonistic nuisance to Forest Conservancy into the most loyal servants of the Department. This naturally could not have been effected in the same satisfactory manner without the settlements on the principle described. Thus the extension of *taungya* arboriculture rose in 1880-81 by upwards of 1000 acres and went on growing till it culminated in 1897-8 in the planting up of 4100 acres. The area recorded as sufficiently successful by the end of this year amounts to 52,000 acres.

The cost of these operations have up to date amounted to some Rs.7,85,000, or Rs.15 per acre, a sum which includes all weeding and cleaning, but not thinning operations, which must sooner or later be taken in hand; for, as in the case of deodar and many other species, the poles in a more or less compact young teak growth, such as found in plantations, do not get suppressed and killed out soon enough, and getting drawn up in the crowd prevent the full and early development of dominant stems.

This enormous annual extension of the teak *taungya* plantations is very satisfactory, and the productiveness of large forest areas has been greatly increased by these measures. Of course, there may be calamities such as fires and insects, but even discounting these, I think it may be safely assumed that the areas so far planted will, when mature, yield an annual supply of 30,000 tons of timber, and an income of 7 to 8 lakhs of rupees.

It has, however, been asserted, and I fear sometimes on good grounds, that in the desire to bring very large areas within the scope of rapid improvement, the selection of the places to be cultivated has not, of late, been always entirely judicious, and has included places where the tree is already sufficiently represented and where

no impediments existed to secure its regeneration by means of protection and improvement fellings. Under such conditions, teak *taungya* cultivation is out of place. It may be advisable to curtail the wholesale extension of teak *taungya* plantations, and to divert the funds which thereby become available to protection and silvicultural measures. *Prima facie* such plantations should be restricted to areas more or less under the influence of dense shading, gregariously flowering bamboos, and to such localities where the tree has been exterminated, care being taken not to try to extend them to areas where the soil and other physical conditions are unsuitable to the tree. For such localities the method was originally devised. In forests, under cover of dense bamboo, no great apprehension need be felt about the occasional damage done to a few teak trees in a *ya*, or even about their destruction. It is, moreover, very difficult to judge from isolated trees left standing in a *taungya* what their chances would have been if the natural forest had been left standing, and even less can be told from stumps found; but such observations have been used to prove the assertion that the *taungya* cultivation had been injudiciously extended of late. Though some seed-bearers even may exist and grow up in gregariously flowering bamboo forests, the dense cover prevents all possibility of regeneration, except at long intervals during the period of flowering, and it will, under such circumstances, be better to create scattered, compact, well-stocked areas even at the sacrifice of a teak tree here and there."

There was one criticism of the teak plantations, which had thus been made with such success and at so low a cost in Burma, which was brought forward towards the end of the period here considered. The work of thinning, which Ribbentrop says is essential, had not been carried out to the degree which was essential. The same criticism was made in the early days of the Nilumbar operations, both by the Marquis of Tweeddale, then Governor of Madras (I, p. 97), and by Cleghorn (I, p. 304). The thinning of the young plantations was necessary, and should have been carried out even if it meant postponing the extension of the plantations for a few years. This remark applied as forcibly to Burma, where the small staff and heavy work connected with reservation of forest areas and the introduction of protection left little time to the officers for duties of a more professional nature. It was admitted that many of the young crops were suffering from want of this necessary silvicultural operation.

The next plantation work of considerable magnitude which demands consideration is that connected with the *deodat* in

the Western Himalaya, in the Punjab and North-West Provinces. The idea had been originally entertained of forming large plantations in areas selected in accessible positions from which the material could easily be extracted, placed in the rivers and floated down to the plains. For many reasons this idea did not eventuate, and no extensive plantations of this species existed at the close of the century. Considerable attention was, however, paid to the artificial cultivation of this tree, and a great amount of data on the subject of its silvicultural requirements had been collected. In the aggregate a certain number of areas had been stocked and were annually being increased by several hundred acres in accordance with the provisions of existing working plans. For instance, the working plan for the Mundali Forest in Jaunsar (North-West Provinces) prescribed the planting of upwards of 200 acres annually. The difficulties experienced here were principally of a twofold nature. The seed was often sown in patches in terrace formation on contour lines. The *Indigofera*, a pernicious weed, grew up between the prepared lines to a height of 8 feet or so, and choked out the young plants. The other enemy proved to be species of root-feeding insects, which either destroyed the roots or cut through the young seedlings. Since there was no market for species which were interfering with young existing deodar on the ground, the method was resorted to of girdling the trees. Mistakes were inevitably made in overdoing this operation, and thereby losing the young deodar whose condition it was wished to assist. Nevertheless, by 1900 considerable success had been attained in work of the kind, as also in filling up blanks in existing old woods, and the way had been prepared for progress on a larger scale in the future.

The other plantations in the Punjab requiring notice are those of the sissu (*Dalbergia Sissoo*). These are of two types—the one maintained by irrigation water and the other grown on areas where the subsoil moisture is sufficient. The famous Changa Manga plantation (of which further details will be given in a subsequent part of this work) is the most important and successful. The extent of this plantation amounted to 8400 acres in 1900. It is situated almost forty miles from Lahore, and as one approaches it across the sun-baked, barren, khaki-coloured country the cool green upstanding line of the plantation presents an extraordinary contrast. This plantation is one of the classic pieces of work of this nature, since it was the

first undertaken on this scale. Ribbentrop describes the formation as follows: It was established in the centre of the dry forest area, where the long-rooted *bar* trees alone can exist, but is now, under the influence of irrigation, covered with a complete crop of sissu and mulberry. The plantation was begun in 1866, but no success could at first be obtained. In 1868 Mr. Amery, then in charge, had the idea of employing a trench and ridge system. When I took over the division, though but a comparatively small area had been stocked, I felt convinced the correct principle had been ascertained, and within a few years the whole area was planted. The plantation had been a sylvicultural and financial success in spite of the high rate for canal water charged against it. Under the working plan it is treated as coppice with a few standards, and we are already occupied in reaping the crop of a second rotation." The material, it may be added, was sold in Lahore. Most of the other type of sissu plantations on the *sailaba* lands which receive the percolation from the rivers, which suits this species admirably, were established between 1867 and 1874. The growth of the species is even better on these lands than at Changa Manga, and as there is no water rent to pay the financial results have been even better.

The plantation work of importance in Bengal was mainly confined to the Chittagong Division in Eastern Bengal. A plantation of teak was made near Kaptai on the banks of the Karnafuli River, some forty odd miles up from Chittagong. The plantation was known as the Sitapahar teak plantation and was commenced about 1871-2. It consisted of 600 acres of fully stocked area and had cost Rs.70,000. This plantation, which showed great promise, was unfortunately blown clean out in October, 1897, as it lay in the path of a terrible cyclone which swept up into the hills from the Bay of Bengal, causing a great loss of life in the low-lying coastal areas. The writer was in charge of the division and had the opportunity of conducting Mr. Ribbentrop, Inspector-General, who made a personal visit to the devastated area.

In the neighbourhood of Kaptai there were some experimental plots, for they were scarcely more, of various species, including mahogany and rubber trees. The latter was being planted out with the object of extending a first beginning of a plantation here during the closing years of the century. Great difficulty was experienced in the regeneration of the *sai* in some of the forests in Bengal (Duars). In 1875 Schlich clear



CHANGA MANGA PLANTATION, PUNJAB. YOUNG 2 YEAR OLD SINGI COPPER WITH STANDARDS
Reproduced from the "Indian Forester," Vol. XXVI

felled and planted an area in the Buxa Reserve which was successful—but this example had not been followed up to the close of the century.

In Assam two quite distinct types of plantations were established—the one of teak, the other of rubber. The Kulsi teak plantation was formed between 1872 and 1881, and extended to 170 acres only. This plantation was a fair success, and its extension was under consideration at the close of the century. The plantation obtained some notoriety in 1879 owing to many young trees being attacked by an insect, the grub tunnelling up the stems and upper shoots of the young trees which were liable to snap off. Mr. A. G. Mein wrote an account of the attack in the *Indian Forester* (IV, p. 347).

The plantation of india-rubber (*Ficus elastica*), which was formed at Charduar, was planted with the direct object of replacing the rapidly diminishing supplies from the natural rubber trees of this region which it was foreseen must ultimately be exhausted. The considerable price realised for this rubber at the period and the growing demand rendered the step an imperative one, it being hoped that if Government demonstrated that the plantation could be made a commercial success, private enterprise would subsequently take up the matter. The plantation was commenced by Mr. Gustav Mann in 1873, and by 1883-4 an area of 892 acres had been stocked with rubber trees. Ribbentrop describes the progress of the plantation to 1900 as follows :

“ Mr. Mann, fully convinced of the financial advantage to be gained, strongly recommended an indefinite annual extension at the rate of 200 acres per annum. The Government of India supported this proposal, but the Local Government not taking the same view, the work languished, and in 1889 the plantation had extended to only 1043 acres. During that year I visited Assam, and a new impetus was given, and during the next four years 860 acres were added to the planted area. In 1894, however, the work was stopped once more for financial reasons. This had been threatening for some time, and the establishment of new nurseries had been neglected, and, instead of providing a proper continuity of healthy young nursery plants, the under-sized and suppressed specimens from the old nurseries were used, which accounted for comparative want of success in the final plantings of 1893. Mr. Hill, when acting as Inspector-General, visited Assam in 1896, and recommended that the work should once more be vigorously taken in hand. When I visited the plantation, however, in 1897, I strongly deprecated an immediate extension with the bad planting material available.

However, the establishment of new nurseries had already been begun, and a continuous supply of fresh plants will now be maintained. It has been temporarily settled to extend the plantation by another 1000 acres during the next five years, but the annual establishment of new nurseries must not be neglected or, owing to the absence of good planting material, further extension will be much delayed. Moreover, of late years the planters of Assam have begun to grow *Ficus elastica* in their waste land, and are glad of any surplus of healthy plants, which they should have for the asking. In 1898-9 some experimental tapping was undertaken, and the net profit realised amounted to Rs.93 per maund, against Rs.60, which formed the basis of the calculation, in consequence of which the extension was stopped in 1894."

THE WASTE LANDS

By the end of the century something had been accomplished in the country in the way of forming plantations, but it had been realised that, so far as the great bulk of the forests were concerned, silvicultural treatment and natural regeneration, combined with certain assistance, would have to be relied on for their maintenance. In addition to the areas classed as forest, however, there existed in each Province a large extent of waste land, aggregating upwards of 380,000 square miles, or considerably more than one-third of the entire area of the British provinces. These waste lands still continued to furnish poor pasturage, only the scrub and scattered trees yielded fuel, and on a small scale small timber for building and agricultural implements. The problem of properly treating these lands had been scarcely touched by the Department. The strength of the staff was altogether insufficient, and funds were not available to grapple with the giant task of turning these wastes into productive areas, both as a source of supply for the people's requirements and as a producer of revenue. This work formed one of the most important, but at the same time one of the most difficult, tasks awaiting the Indian Foresters of the future. On a small scale something in this direction had been commenced by the formation of canal plantations, already mentioned in a previous chapter (p. 307, and by the establishment of fuel and fodder reserves in a few districts. But it was evident that these were only pioneer beginnings. It was necessary that this work should be undertaken in all provinces on a much more comprehensive scale and on a well thought-out and methodical plan. Under

systematic and good management these waste lands should be made to produce heavier crops of fuel and cattle fodder. Manure was still in use as fuel in most provinces, with the result that in spite of the skill and industry with which the Indian *ryot* cultivated his land the yield of crops was poor. Dr. Voelcker, in his Report on the improvement of Indian agriculture, justly urged the establishment on a large scale of fuel and fodder reserves in order that wood fuel might take the place of cow-dung fuel, the latter being then used to manure the fields. "If wood," he wrote, "could be made to take the place of dung for fuel, we should soon come to realise that more wood means more manure, that more manure means heavier crops and an increasing fertility of the soil." But some twenty years before, in 1873, Schlich had suggested the formation of fuel reserves in Behar, in order to save the cow dung for manure, and the suggestion had been made by others. The analogy of the system of communal forests on the continent of Europe would seem to apply to these waste lands. That, in fact, the creation of communal fuel and fodder reserves in the ownership of the villages and small towns, the work being undertaken by the Department, as also the future supervision of the areas as is the case in Europe, may in the future be a possible solution. It will, admittedly, be a work of gigantic magnitude and difficulty, but given the staff and the requisite funds it will not prove beyond the capabilities of the Department, as this history will indicate.

THE IMPROVEMENT OF THE FOREST CROPS

In previous periods of this history it has been made evident that a great proportion of the accessible forests of the country were taken over by the Department in a more or less ruined condition. They were full of over-mature, hollow, or badly shaped trees, which the former timber merchants, who had cut out all the marketable material, had left behind as worthless. And the areas were still subject to firing and grazing. After the inauguration of the Department the first steps taken, as has been mentioned for Oudh and the Central Provinces, ~~was~~ to get rid of these old unsound trees wherever possible, provided they were no longer required, if not too old, as seed-bearers. This operation was combined with creeper cutting, an operation of absolute necessity if the trees were to be saved from slow strangulation. Creepers also smother and kill

young growth and interfere with the production of straight timber in older trees. The epiphytic *Fici*, or figs, are also a danger, as had been drawn attention to by Latter and correctly explained by Falconer (I, p. 232). The seed deposited on the trees in the fork of a branch, and often in the crown, rapidly encloses the tree in a network which gradually strangles and kills the tree. The only measure which had been found practical up to the close of the century was the one suggested by Falconer, viz. to fell the tree. As regards the creeper cutting, by the methods in force millions of creepers were got rid of during this early period, and the cleanliness of the crops in this respect came to be looked upon as a test as to whether the subordinate staff, Foresters and Forest Guards, were looking after their beats properly. This work was systematically provided for in working plans as they came in force. These were the initiatory stages in the introduction of silvicultural work in the forests. As soon, however, as the trained officers began to become sufficiently senior to obtain charge of the forest divisions in any numbers, matters progressed beyond this first stage. The system which was adopted and carried out up to the end of the period was what is known as "Improvement Fellings." It was recognised that the introduction of this latter work must go hand in hand with the protection from fire and the restriction of grazing. Once the areas had been constituted reserves with demarcated boundaries, fire conservancy and, so far as possible, the regulation of the number of cattle were the next steps. With these matters regulated, or provisionally regulated, it was possible for the divisional officer to devote his energies to the work of improving the crops on the ground. The work necessary varied in degree according to the locality, species present on the ground, and the condition in which he found them. Other factors limiting the work in this respect were the size of the forests to be dealt with, the possibility of disposing of the timber to existing markets, the existing communications and facilities for transport, the size of the staff at his disposal, and whether possessed of any training in forestry, and finally, the silvicultural knowledge of the officer himself.

It will be readily perceived that these factors varied enormously in different parts of the country and accounted for the apparent slow progress made in some parts, and as a whole its varying nature. For instance, in some parts of the North-West Provinces the forest areas were in comparatively

small compact blocks with a dense population on their boundaries. Sylvicultural operations commenced at a comparatively early date in such forests, and by the close of the century promising young sâl crops, with a fair approach to normality, were to be seen. In the School Circle forest area, it will be remembered, work was commenced almost from the inauguration of that educational establishment, and very excellent results were to be seen later. The forests of the Dun (which formed part of this Circle) had been ruined by destructive fellings (*vide* p. 330 ; also Vol. I). Ribbentrop says that when he first saw these forests in 1869-70 they "were in a terrible state. In 1900 they formed an almost compact pole forest, which must delight the Forester's eye. I always like to show these to visitors, but the majority of the non-professional men will not believe in their former ruined state."

Such forests proclaimed the fact that silviculture on Indian departmental lines had commenced to take shape in India. And areas of this kind were under working plans, which had already assumed some complexity in drafting. But at the close of the period it must be confessed that such examples were rare. In the Central Provinces some progress had also been made in this respect with sâl, and to a limited extent in Bengal. In the Western Himalaya some of the deodar forests had received a considerable amount of attention. But for these successes there were vast areas of forest under the Department which were still only passing through the initiatory stages of treatment. The writer joined the Singbhum Division in Chota Nagpur in the early 'nineties as a young, newly out assistant. In this magnificent area of sâl forests there was but little demand. The annual revenue did not cover the expenditure, and the improvement work undertaken was confined to the annual marking of a few hundred trees for sale. This division was one of the exceptions to the more common rule of ruined forests. As mentioned on p. 395 these forests were inaccessible owing to want of communications, and therefore had escaped the more usual universal destruction. They contained a very large surplus growing stock, which on the advice of Hill, ~~at the~~ time officiating Inspector-General of Forests, was cut out between 1896-8 and utilised for sleepers for a State railway in the North-West Provinces. This work necessitated opening out communications, building bungalows and adequate houses for the staff, and other improvements all to the benefit

of the forest. This work completed, it was possible to prepare a working plan for the area and commence serious sylvicultural operations.

Large portions of the forests were not, however, in so favourable a case, and the work of sylvicultural improvement proceeded slowly.

As has been said, the improvement fellings varied. The main idea underlying the treatment was to favour the valuable commercial species and eliminate the less valuable and those interfering with the growth of the former. Subsidiary work was to encourage the younger age classes, i.e. the younger trees of the valuable species, by removing weeds and low growth tending to choke them, and to lighten the cover overhead by girdling or removing inferior species of trees. The improvement fellings themselves would naturally vary greatly in intensity in the class of forest here considered—the deciduous or leaf-shedding mixed forest containing a considerable number of different species of trees with probably areas of bamboos or a second story of bamboos, shrubs, and so forth. The abundance of the valuable species, of which only a few had any commercial value at this period, had first to be carefully ascertained, both old trees, middle-aged and young growth and seedlings. The degree or intensity of the necessary improvement felling or thinning would thereby be determined. To the trained Forest Officer the treatment would then have been fairly easy, but for the serious drawbacks that faced him. He knew little about the sylviculture of the species he was dealing with, their rate of growth, the soils best suited to them, aspects, and the amount of shade they preferred or would stand. Consequently when the improvement fellings first commenced in a forest, the sâls areas, for instance, it was imperative that the work should be undertaken cautiously. The trees stood on the ground in mixture of all ages. Any undue interference with the canopy would seriously reduce the productive capacity of the soil in a country subject to a long hot season followed by a heavy monsoon, such as is experienced in India. In a forest of this kind the young growth of the more valuable species was often overtopped and suppressed by large trees of inferior kinds. The object sought to be attained by these fellings was to obtain a more vigorous new crop containing a far higher proportion of the more valuable commercial species than existed in the old natural forests. The work, as it proceeded, consisted in dividing up

a forest into blocks and going over each block in turn with an improvement felling, the intensity of which was dependent on the condition of the forest under treatment.

When the sale was possible, the mature trees, when not required as seed-bearers to regenerate the area, were marked for felling, and the inferior species (which at this period included all those for which there was no market owing to their timbers not having come into general use) were either felled or girdled wherever they interfered with the development of young growth of the valuable ones. This was a rough-and-ready procedure, the only one possible in the large areas being dealt with. Its great drawback was to be found in the fact that it filled the forests with a large amount of dry and inflammable material, the treatment being consequently restricted to fire-protected forests. A few years of successful fire protection witnessed the disappearance of this material, since it rapidly rotted under the influence of the heat and monsoon rains, much of it also being bodily removed by the work of termites, the great scavengers in this respect of the Indian forests.

When the first fellings had gone round the whole forest, they were re-started in the first block. This work, combined with fire protection and restriction of grazing, had produced remarkable results in some localities by the end of the century—even when the comparatively short period it had been in force is taken into account. In fact, in some instances the question of the advisability or possibility of changing the treatment to one of the other more technical systems in force on the Continent of Europe was being considered, although the areas had been under working plans for scarcely more than one period of the plan.

One important feature, then, of this work was the imperative necessity of assisting the younger growth on the ground. In many cases it was found that the younger age classes of the forest were sadly deficient, especially of the more valuable species. These latter were often slower in development than the quicker inferior species, or were very liable to be choked out by the dense mass of weed growth and grass, or to be killed out comparatively early by the quicker-growing soft ~~woods~~ or bamboos, and so forth. The treatment prescribed careful attention to these matters, and sought to make provision for filling up blanks by scattering seed broadcast or even planting up with seedlings taken from elsewhere in the forest where they were plentiful. That this work could not be carried out

with anything approaching to thoroughness by the officers in charge of divisions at this period was due to the enormous areas they had to control, the paucity of the staffs, and the want of education in forestry matters of the greater proportion. For careful supervision was a *sine quâ non* if success was to be attained by these operations. Nevertheless, a considerable amount of data was collected and some progress made in the knowledge of the species, a comparatively small number, which had a commercial value at the time.

It was found that the work proceeded with the least difficulty, if the term may be used, where, in the absence of silvicultural knowledge of the individual requirements of all the species dealt with, the species appeared naturally in unmixed forest, such as the sâl and deodar. The teak, however, gave greater trouble. In previous parts of this history the absence of teak regeneration has been commented upon by early observers, such as Wallich, Falconer, Tremenheere, Guthrie and others. It was generally attributed to the fact that the seed did not germinate easily. This question received considerable attention during the period here considered.

In the evergreen tropical forests the vegetation was luxuriant. In these forests the removal of an old tree, leaving an open space, resulted in the latter becoming densely covered with high grass, bamboos, plantains, wild ginger and so forth, or with a dense crop of seedlings of an inferior fast-growing species. It has been shown that such was the aftermath of shifting cultivation, under which all valuable species of tree disappeared from the area. The regeneration of this type in its varying conditions remained one of the most difficult problems facing the Department at the end of the period. It is well represented by the forests of the Chittagong Hill Tracts and South Lushai Hills, which contain such valuable timbers as *Lagerströmia Flos-Reginæ*, *Dipterocarpus*, *Xylia*, *Acrocarpus*, and many others. These forests were being exploited (they were termed unclassified forests), with but little efficient safeguards owing to lack of staff, up to the end of the century to the knowledge of the writer, who held charge of the division ~~in the~~ closing years. The silviculture of these species and their requirements was a sealed book in these regions.

That this was the position at which the Department had arrived in 1900 is evidenced by the following brief summary by Ribbentrop :

" Here in India it is necessary to rely almost entirely on the

natural reproduction of our forests. For a more intensive management the areas to be treated are by far too vast, and the average cash revenue per acre is too insignificant. The local demands are, as a rule, supplied free or at low rates; and rights or concessions, or the exclusion of large areas or the free supply of forest produce to the agricultural population, very frequently cause the utter absence, or at least slackness, of demand in the local markets. It is evident that, under the circumstances, the cheapest way of securing the continuity of the forests must, as a rule, be adopted, though an increased expenditure would frequently secure more rapid returns. Even if the money were forthcoming, we have not as yet the necessary trained staff to supervise the planting operations on a scale which would render the aggregate anything but insignificant if compared with the large extent of forests in charge of the Department. . . .

By continuous study of the conditions of the various forests the knowledge of the Indian Forester, as regards the regeneration requirements and treatment of his species, has considerably increased and is growing from day to day. Such knowledge as we may possess is brought to bear on the prescriptions of working plans, a network of which is gradually being spread over the whole forest area. The science, however, of the correct treatment of all classes of Indian forests is as yet in its infancy, and its study, I must say, looking back on the number of years I have been in India, of which a considerable portion has been spent within the forests, seems almost interminable."

Ribbentrop could have well added that considerable knowledge and silvicultural observations and data, which had been accumulated during this period by officers possessing high powers of observation, was lost to the Department owing to the invincible distaste or disinclination of many of them to put pen to paper. How much valuable information was lost on the retirement or death of these officers it is difficult to surmise; but there can be little doubt—the pages of the *Indian Forester* and the Appendix series bear witness to the fact—that the absence of any concentrated effort to secure the record of the studies made in the forests delayed the more rapid professional progress of the Department. Conceive for a moment what would have been the effect on this side of the Department's work if Munro's knowledge of the Travancore, teak forests in the 'twenties' or 'thirties' of the nineteenth century had been committed to paper and been thus available to future Forest Officers, and if such records had been kept up, even if but partially, to the close of the century, and been available to officers working throughout this long period!

From the progress of this history it will be readily appreciated that when the first commencement was made with the object of improving the crops of the forests it was approached from the view-point of increasing the number of the more valuable species in the areas per acre or square mile. These species were exceedingly limited in number—teak, ironwood (*Xylia*), sâl, sain (*Terminalia tomentosa*), sandal wood, blackwood, khair, sissu, deodar, being the principal ones with, as subsidiary species, padauk (of greater importance before the close of the period), *Hardwickia binata*, *Albizzia lebbek*, *Zizyphus*, *Ougenia dalbergioides*, *Boswellia thurifera*, the sundri (*Heritiera*) of the Sundarbans and the pines (*P. excelsa* and *P. longfolia*), spruce, silver fir and several oaks of the Western Himalaya, and the pines (*P. khasya* and *P. Mercusii*) of Assam and Burma.

With the exception of the conifers, these species grew chiefly in mixture, and in the mixed and deciduous plains forests the Forest Officer concentrated upon the one or two at the time commercially valuable species in his forests. For this reason very little silvicultural knowledge was accumulated on the large number of other species which might have a prospective value in the future.

The treatment which was carried out may then be briefly reviewed from the point of view of the chief species present in the different forest areas.

The teak will be first considered, since it was the first species upon which the hand of the lumberer fell with disastrous results.

The teak grows in a mixed forest of a varied type associated with some other very valuable species, which together form but a portion of the tree crop standing on the area. In one type of this class the tree canopy is comparatively or very open, the ground being, however, covered with a dense crop of gregariously flowering bamboos, e.g. *Bambusa polymorpha*. In a second type the overhead cover is somewhat denser, though usually by no means intact; here the understory is mostly the bamboo, *Dendrocalamus strictus*. Large areas of this type of forest are to be found chiefly in the Central Provinces, Berar, and the northern parts of the Bombay Presidency, where early in this period the teak existed mostly as hacked, gnarled and misshapen trees in mixed forests. A third class showed the tree crop with a fairly intact canopy in which bamboos were either entirely absent or only present in

scattered clumps. Lastly, areas existed of small extent, and usually widely scattered, in which the teak grew gregariously.

It will be obvious that the sylvicultural treatment of these varying types would have to vary, and that only as the result of experience and experiment could the correct method of treatment be evolved.

In the first type mentioned it was considered necessary to reduce the areas occupied by the large gregariously flowering bamboos. It was admitted that they were useful in many ways, but to fulfil the requirements of that time it was held that a far smaller proportion of bamboos could suffice. As has been shown, bamboos for pulp had not been considered seriously till towards the end of the period. The object, then, was to get rid of the bamboos. The attempt to kill them by repeated cutting of the new annual shoots was a failure. These bamboos only flower and seed once (at long and uncertain periods of time) and then die. The great chance for young teak to spring up and occupy the ground is at one of these flowering epochs—since the dense shade of the bamboos is then removed for a time. It became a principle, for which arrangements were fully made, to take advantage of a seeding year to scatter seed widely over all teak areas when the bamboos died. This was done in the case of sporadic flowering over small areas, Ribbentrop having commenced it in 1880. The areas were first fire traced, the dead bamboos then burnt, and teak (as also cutch) seed dibbled in plentifully, and as many plants as were available were also planted out. The success achieved was said to equal that of *taungya* plantations, but the method could only be applied on areas on which there was little existing growth, or where it was in a poor state, so that little was sacrificed by firing the area. It was not difficult to arrange for the carrying out of such measures, since the year before bamboos flower they produce no new shoots. Some 4000 acres had been stocked in this manner between 1880 and 1900, chiefly in localities under *Dendrocalamus strictus*. Towards the end of the century a flowering of *Bambusa polymorpha* was eagerly expected over considerable areas. It was realised that such a flowering would provide the real test of the possibilities on a large scale of securing regeneration and re-stocking of teak in this fashion. The flowering had not eventuated, however, at the close of the century.

It proved that the second type of this class of forest, where the prevailing bamboo is *Dendrocalamus strictus*, was simple

to manage. This bamboo is smaller in height growth with a lighter canopy ; consequently natural regeneration has a better chance of succeeding. It is easier to help the young trees, and some will find their way up through the bamboos without assistance ; this bamboo is also a more sporadic flowerer, thus providing openings in different parts of the forest at different intervals, the young trees occupying these areas getting a start and being safe from being overtopped by the young bamboos. Both teak and cutch seed have been dibbled with success into such openings. In the more open forests in the Central Provinces where the bamboo is not so plentiful, the closing of the forest to grazing and protection from fire was sufficient in many parts to re-establish the teak as the dominant species in many parts of the forest area ; strong coppice shoots were also obtained by cutting back the misshapen old teak standing in the ruined forest.

In the third type of forest where little bamboo is found, improvement fellings have been the procedure adopted with considerable success, inferior species being removed by girdling or felling as already described. At the close of the period this method of treatment had been adopted for some years in the Central Provinces, Berar, and the northern parts of Bombay, and its extension to larger areas in Burma was under consideration.

Great and unexpected trouble was experienced in the fourth type, the pure teak areas, natural regeneration being very difficult to obtain. Ribbentrop wrote : " Whether this is due to the heavy drip from the parent trees " (during the monsoon rains, when the seed germinates, the young seedlings getting plastered and buried in mud), " or other causes is as yet unsolved."

The cutch (*Acacia Catechu*) was held to form an excellent associate for teak in the second and third types of forest, and its reproduction can be attained by very similar means. It is a bad companion in plantations when the trees are of uniform height, as its whiplike branches cut off the new leaves and shoots of the teak much as the young branches of birch do the head of conifers in a mixture of these trees in Britain.

Ribbentrop held the opinion that the measures adopted in these types had considerably increased the teak in all the areas to which the Department had been able to give attention up to the close of the century.

A controversy had arisen as to whether fire protection in



PORTION OF A 6½ YEAR OLD PATCH OF TEAK SOWINGS IN FLOWERED
DENDROCALAMUS STRICTUS. BWEI RESERVE, LOWER BURMA
Photograph by J. H. Oliver. Reproduced from "Indian Forester," Vol. XXVI

teak forests was not a drawback, instead of an advantage, since owing to the dense mass of dried grass and quick-growing species which covered the forest floor, young teak had not a chance of forcing their way up. At this period those who held this opinion, regarded as appallingly retrograde, were in the minority. Ribbentrop deals with this matter as follows :

“ In all classes fire protection is unquestionably a *sine qua non* to complete success. The teak tree has a greater power of resisting the effects of fire than most other trees with which it is associated, and this fact has from time to time been urged against the necessity, or even the advisability, of fire protection when the growth of teak is the desideratum. The last attack on fire protection, made by a practical and scientific man, led to more minute enquiries than had previously taken place, and one of its main features—that a larger amount of teak seedlings was found in constantly burned than in fire-protected forests—was entirely disproved. The number of small plants below three feet high was undoubtedly larger in the former than in the latter, an observation on which the whole argument against fire protection was based ; but most of these represented plants that had been burned down year after year and sprouted up again. There was a remarkable scarcity of larger young trees, and when all young growth up to 20 feet high was counted, the number found in the fire-protected forests were several times more plentiful than those in the open forests.”

But, as will be shown in subsequent parts, the matter was by no means to end with this pronouncement.

The same degree of success had not as yet been attained with the question of regenerating areas of ironwood (*Xylia dolabriformis*) and padauk (*Pterocarpus*). Neither of these species had been exploited to anything like the same degree or for the same period as the teak, the beginning of padauk felling dating from 1888 only. The silvicultural treatment of these and other species was, therefore, more or less in its infancy, whilst some of their associated species were later to receive an unforeseen (at this time) attention.

A tree of altogether another class was the sandal wood (*Santalum album*) of Mysore, Coorg, and adjoining areas of Southern India. The tree had been a royal tree for very many centuries and thus had had the advantage of protection. But its method of growth in very open forest, in fields and

hedgerows, often in the centre of thorny thickets, was against it when agriculture became considerably extended. By the end of the century the silviculture of the tree was being carefully studied owing to the fear that with the large demand and high price fetched by this beautifully scented wood it would be cut out and disappear. The difficulties attending the efforts to introduce it into new localities had not yet been overcome.

The deciduous forests in which the sâl up to this period was the most valuable species have been already alluded to. The chief of the species in mixture with it, to which some study had been given, were *Terminalia tomentosa*, a fine tree which had a local market price, with dalbergias, acacias, *Hardwickia*, *Albizzia*, and so forth.

The two associated species, *Dalbergia Sissoo* and *Acacia Catechu* (the sissu and khair), which covered naturally newly thrown-up islands and foreshores in the rivers of the north, still presented problems for solution, for how to regenerate them on other lands had not been discovered in spite of many attempts. Eardley Wilmot wrote a monograph on sissu and khair (the 'cutch' of Burma). Again, some of the denuded areas in the Central Provinces and in the Poona District had been experimented upon, the former by sowing the seed of *Zizyphus*, *Ougenia dalbergioides* or *Boswellia thurferia*; or by merely closing and protecting the areas remarkable results were obtained.

Another type of forest had already received some considerable discussion and attention at an earlier period—the alluvial forests on the banks of the Indus. *Acacia arabica* and tamarisk are the chief species here. They form the natural forest and can be maintained without difficulty provided water is available. The trouble experienced in this connection was the embanking of the river for irrigation schemes, which inevitably led to the death of the forest areas thus left dry, since they depended entirely on percolation or overflow for their water supplies. Such areas would then assume the character of the forests of the dry region, such as exemplified by Ajmere-Merwara. Here it was considered that success in the regeneration of such species as exist in this region would be realisable by the enforcement of protection against grazing and fire. Of such areas Ribbentrop wrote in 1900 :

" In many parts of this area régénération, though it may be slow and uncertain, is by no means hopeless, and doubtless many areas,

as for instance in parts of the Deccan, are condemned to this class, because they have been utterly devastated by fires and grazing and would require a century of careful nursing before they would reassume their pristine, forest-clad appearance. In the same proportion as forest reproduction becomes slower and less certain in drier zones, it gets more sensitive to interference by man, fires, browsing and grazing, and requires, if success is to be attained, a proportionately stricter treatment.

There are, however, dry forests in the centre of the dry zone, and where it shades off into desert land, still containing an open bushy crop, with sometimes a fair amount of firewood per acre. About the origin of these and their final regeneration from seed we know practically nothing. All we know is that they have enormously long roots, which have been followed down to the depth of 70 feet without finding their end, and that they throw out coppice with great, and so far apparently undiminished, vigour. We rely on this and on their extent; but whether, and how long, the productive power may last is an open question. Fortunately they are economically of greater importance as grazing grounds than as wood-producing forests; and large areas thereof are so situated that, by means of the great canals the British Government have been and are making, they can be converted into rich wheat fields."

Of the forest types of the plains there remain the littoral and tidal forests on the shores of the sea and tidal parts of the great rivers. The forest of the Sundarbans in Bengal form the best example of this type. The silvicultural management of these forests is fairly simple. Well drawn-up felling regulations and proper protection, with an efficient police system, form the chief requisites. Reproduction of these forests from seed is plentiful, the water being the medium by which the seed is spread and the seedlings from the latter are supplemented by coppice shoots. These forests are gradually moving out seawards, as is proved by the existence of submerged forests inland to the north of Calcutta. A more detailed description of these forests will be given in a later part.

There remain for consideration the coniferous forests of the Western Himalaya in which at the period the three chief marketable species were the deodar, blue pine (*P. excelsa*), and *P. longifolia*.

The history of the deodar forests of the Punjab Himalaya has been already detailed, and the excessive fellings to which they were subjected between 1854 and 1864. Fortunately those of Jaunsar and Tehri-Garwhal were not opened out during this period, and when they came to be worked the operations were carried out under the ægis of an existing

Forest Department. Many of the former had been ruined by the reckless fellings undertaken in them, and the ground had become covered with a weed growth of *Indigofera*, brambles, etc. For some years the regeneration of such areas was not fully understood. Artificial aid was introduced and seed sown on contour lines cleaned of the weed growth. The dense growth of the *Indigofera* interfered with the development of the seedlings, but in areas where this trouble was absent the young growth did not develop satisfactorily. It was ultimately discovered that the overhead canopy was being kept too dense. That the deodar, in effect, required more light than had been first credited. With the knowledge attained on this subject by 1900, which was incorporated in a Monograph by Ribbentrop in the *Appendix Series*, it appeared probable that Forest Officers had erred on the safety side and kept the forest too dark, the period taken to regenerate an area being longer than was necessary for this species. In this connection Ribbentrop discovered a peculiarity of the deodar; a considerable proportion of the trees only bear male flowers year after year. This obviously makes the selection of the seed-bearers to be left standing in the forest a matter of greater difficulty, necessitating close observation on the part of the staff. The difficulty is aggravated when the area being dealt with consists of high mature forest, the crowns being at a considerable elevation from the ground. In the mixed forests the tree most commonly associated with the deodar is the blue pine. This species grows quicker than the former on deep soils which are favourable to it. Consequently the regeneration of the deodar presents greater difficulties, and inevitable mistakes were made which resulted in areas of blue pine being obtained in lieu of deodar, the intention having been that the latter should form the greater percentage of the crop. In dealing with species whose silvicultural requirements are inaccurately known, such mistakes are unavoidable at the outset. Ribbentrop describes the position at the end of the century as follows: "I may, however, claim for the officers of the Department that they know how to treat all forests in which the deodar appears to the best advantage. . . . Fire protection, closure against and regulation of grazing and correct silvicultural methods have, independently of artificial plantations, insured, as regards this tree, a far more extensive and richer crop for the future than that which we have reaped and are in the course of reaping."

With reference to the treatment of the other species, Ribbentrop gives the following summary in his *Forestry in British India* :

"The next point which I think it desirable to touch upon is the natural regeneration of the other pines in the Upper Himalayan Forests—*Abies Webbiana* (Pindrow) and *Picea Morinda* and the *Pinus excelsa*. As regards the latter, which is the most valuable of them, there is no difficulty at all. On suitable soil and under decent protection it grows like a weed as soon as sufficient light is admitted, and spreads on the outskirts of the forests whenever the area skirting it has the slightest rest from interference. As regards this latter point, the forests of *Abies Webbiana* and *Picea Morinda* show a similar inclination ; but we find very great difficulties in attacking a mature forest of these species with fair results regarding their regeneration.

In most instances forests of this kind are as yet of comparatively little value, as it does not pay, until a further advance has been made in the impregnation of inferior pines, to exploit them for exportation of the timber to the plains of India. There are, however, certain areas in the vicinity of hill stations and cantonments which by their situation are of importance. There is no shirking the question that in regard to these we have not as yet achieved sufficient success, and are, I am inclined to believe, living as yet to a certain extent on capital. The question whether it would not be advisable in the end to resort to clear fellings and replanting seems to draw near. I think it would be the most simple and practical solution of the question. The reproduction of the various oaks in the higher hills and of the mixed oak and pine forests is well understood, and almost invariably success in their treatment may be claimed.

At a somewhat lower level we come to the extensive areas of *Pinus longifolia* in the north, and *Pinus khasya* and *Merkusii* in the south-east of the empire. Their regeneration is very similar, and requires nothing beyond strict fire protection and sufficiently open *coupes*. In the north of India, large areas are under protection and proper management, but many and extensive tracts, especially in the Punjab, are still exposed to conflagrations to which they are excessively liable, and in the Burma hills, where the forests are very remote, inhabited by a *taungya*-cutting population, and as yet of little commercial value, fires still cut into them year by year and lessen their extent. This is a great pity, for perhaps no trees are so grateful for fire protection, and whenever a few parent-trees have been left, *Pinus longifolia* forests spring up on protected areas with almost incredible rapidity where reproduction was a few years ago almost at a standstill."

This brief summary of a species (*P. longifolia*) which has since

acquired so great an importance is significant of the position it held at the period. In spite of the early attempts to make use of it for railway sleepers (I, p. 507) it had advanced but little in commercial importance by 1900. Ribbentrop continues:

"Of somewhat peculiar interest is the reproduction of *Juniperus excelsa* in the west of India. The tree as it grows there is very tapering, the timber is knotty and yields inferior firewood only, but it represents the main portion of the wood supply of those arid hills. For years it was believed that no natural reproduction took place at all; but this is not the case, and a fair supply of seedlings is found under the shelter of the long, drooping branches of the parent trees, which almost sweep the ground. Naturally nothing can be done under such circumstances beyond insisting on a careful fire protection and exclusion of grazing wherever exploitation takes place."

No mention is made of another important tree in the hills of this western region, viz.—the Chilgoza pine (*P. Gerardiana*). The forests of this species were chiefly on the frontier and were owned by the border tribes, who in the southernmost areas were under British political officers. There were several fine, if small, forests of this species in Northern Zhob which were being seriously mismanaged, chiefly by grazing, at this period. The regeneration was, however, impeded owing to the seed of this pine being edible and an article of some commercial value. The tribesmen collected the cones in a most crude fashion, breaking the branches and deforming the trees in the process, opened them by heat and extracted the seeds for sale. Reference to these forests will be made in a later part.

There remains for a brief consideration in this section the question of thinning. To the professionally trained Forester the necessity of thinning woods throughout the greater part of the rotation is one which precludes argument. The question of introducing orderly thinning arrangements into the vast areas with which the Department had to deal in India was one which made but scant progress during this period in the majority of cases. The paucity of staff and the fact that the bulk of the subordinate staff was untrained offered an insuperable barrier to the progress of this work. The trained officer of the Controlling Staff was well aware of the injury taking place to his crops, that their development was being retarded and that the final yield in material would be reduced—perhaps largely reduced. But he was equally cognisant of the fact that thinning operations done badly do more harm than good to the



OUR PINE GROVE, LAVALLE, B. C. FOREST, SHOWING NATURAL REGENERATION IN THE FOREGROUND,
TODD, KEMAN, N.W. PROVINCES, OF LOBER 1800

Photograph by S. S. K. K. K. K.

crop. With his heavy administrative work he was unable to supervise this work himself, save in a spasmodic manner, and his staff were incapable as a whole—brilliant exceptions there were—of undertaking it. A further difficulty confronting him, even had he the time or staff, was the cost involved—since the thinnings in the younger crops, owing to the extensive areas under his charge, were unsaleable save in the cases where a dense population lived in the neighbourhood of comparatively (for India) small forest areas. To the end of the period as a general rule, therefore, thinning operations had not begun to be undertaken to any serious extent in the bulk of the forests under the Department. The species in which some headway had been made were the *sâl* and *deodar*. In the case of plantations the position was different. In these thinning operations were undertaken with care. In Burma it had for some reason been hoped that the teak plantations formed by the *taungya* method would to a great extent clean themselves and thus obviate the necessity of early thinnings. This hope proved elusive, and considerable anxiety was being felt at the end of the century in this matter, the imperative necessity of commencing thinning work in some of these areas having been realised. The great difficulty in this connection was the inadequacy of the staff in Burma to cope with this work.

CHAPTER XIX

THE INTRODUCTION AND GROWTH OF FOREST WORKING PLANS IN INDIA, 1871-1900

THE credit of having been the first to introduce a simple form of forest working plan in India must be ascribed to Mr. Munro, who was Conservator or Superintendent of Forests in Travancore in the 'twenties and 'thirties of the nineteenth century. Munro had made some study of the teak and its rate of growth, as has been detailed in Vol. I, pp. 73-4, his figures being based, as he says, on his "own personal observation and the experience of nearly twenty years in the woods." He makes some scathing remarks on the subject of the unchecked, reckless and wasteful felling by contractors in the Malabar Forests, and added that a Parsee contractor had commenced the same devastating methods in some Travancore Forests, operations which Munro was able to have stopped. That Munro was working his forests with some knowledge, based on a computation of their contents—in other words, that he had a simple form of working plan in force for teak—is evidenced by his estimate in 1837 that he would have "100,000 trees fit to cut that season." Nowhere else in India at that period, or for long afterwards, could such a forecast have been given with any pretence at real accuracy.

We have seen that at a later date Cleghorn, during the period he was Conservator in Madras, endeavoured to obtain figures of the contents of the remaining teak forests with the object of checking over-felling.

In Burma the first officer who attempted to obtain figures on the rate of growth of teak in the Tenasserim Forests was Captain Tremeneheere (*vide* I, p. 158); and Captains O'Brien and Guthrie made some attempts to carry on this work in the same Province.

"It was McClelland in Pegu who first suggested the safeguarding of the forests from over-cutting by adopting a definite

girth limit, based on an estimate of the quantity of trees of this size and over in the forests; fellings not to take place in the areas until such an estimate had been made. The trees were to be marked and girdled by the officers of the Department only, and no immature trees were to be felled; severe penalties to be inflicted in case of infringement. This suggestion had, it is true, been put forward in the past in Tenasserim, so far as the size of the trees to be cut was concerned, but the rules sanctioned by Government had never been obeyed or enforced. The Commissioner, Captain Phayre, did not agree with all McClelland's proposals and the latter resigned, to be followed by Brandis.

Brandis, we may be sure, had made himself acquainted with the Reports and literature available on the management of the forests in Madras (Cleghorn), Bombay (Gibson) and in Burma itself.

He would have, therefore, been aware of the attempts which had been made so far to check the wasteful exploitation which was in force. Brandis also started his work with Lord Dalhousie's clear pronouncement on the right of ownership of the Government to the teak forests of Pegu. This position, however, in no way diminishes the credit belonging to Brandis in introducing a first fairly accurate method of ascertaining the growing stock of the forests by his linear surveys, and framing what was, in fact, the first working plan for their management.

Theoretically, the strict and defined administration of a forest under a working plan would appear to necessitate as a preliminary factor a full knowledge of the silviculture of the species of tree being grown, combined with a variety of other data based on the results of detailed scientific forestry research. Such research, as will be shown in a subsequent chapter, had not been attempted up to the close of the century. But the want of adequate knowledge, or better expressed, of detailed knowledge, on the subject of the species of trees need not, and should not, delay or preclude the placing of forest areas under the prescriptions of a working plan; the detail with which the plan is drawn depending upon the data available and the demand for the products of the forests. Too often in the history of the management of the forests of our Empire, often from want of the necessary amount of scientific training on the part of senior officers and the paucity of staff, combined with the ignorance on the part of the

other civil authorities the introduction of working plans has been delayed on the supposition that only when the forests had been restored to something like normality could such plans be introduced. Or, again, the proposition has been advanced that the preparation of such plans could only be justified when a demand for the produce from the area, with a resultant revenue, had arisen. Too often, however, in the latter case a sudden demand upon the forest, such as may be produced by the advent of the construction of a railway in its neighbourhood or through it, the cutting out and ruin of the forest has preceded the introduction of the working plan.

In the past it was not always realised that the prescriptions of a plan might be quite simple, and yet once in force they would safeguard the area placed under the plan from the danger of further deterioration. In India this lesson has been learnt, although the recognition by the Local Governments of the necessity of placing their forests under working plans was slow, the necessary funds were grudging and the forest staffs far too small to enable progress to keep pace with the urgency of this important matter.

Outside India the rest of the British Empire has, for the most part, yet to realise the imperative necessity of putting an end to waste and ignorance in the treatment of the bulk of the forests by recording and settling all rights in and over the forests and then placing them under the safeguard of the working plan.

It will be asked by those who have not received a scientific forestry training, What is a working plan? It is a statement drawn up for a certain area of forest land, laying down and prescribing the whole of the operations which are to be carried out within the area for a definite number of years, i.e. it prescribes the whole management of the area, having in view the objects required from the area and assuming their realisation to the fullest extent possible.

In the description of Brandis' work during the years he acted as Superintendent or Conservator of Forests in Pegu, given in Vol. I, Chapter XX, it has been shown that one of the first tasks he set himself after joining his appointment was to ascertain, by means of the linear Valuation Survey method, the available growing stock present in the forests of his charge. This work he at first undertook personally, but as it proceeded he trained his assistants, both European and native, to assist him in the work. The advisability and, in

fact, necessity of working the forests systematically had been advocated in some quarters in India for some time before Brandis' arrival in the country, but what was really meant, or aimed at, by such working was understood by but a very few, and probably even these few had very little idea of the amount of work involved in framing an estimate of the contents of a large forest. On the basis of the estimates framed by Brandis, and of the analysis of the rates of growth on numerous stumps and logs, he calculated the annual possibility of his forests, and was thus in a position to prepare preliminary working plans for the areas. Brandis' working plans for Pegu were of necessity, in view of the paucity of data and staff available at the time, drawn up on somewhat general lines, but they were prepared with great care and rarely erred on the side of over-exploitation. These plans, with subsequent revisions, remained the guiding factor in Burma for many years after Brandis had left the Province. In fact, so ably were they drafted that more detailed investigations in later years showed that, in many cases, little deviation was required. And in others they gave proof of the caution displayed by proving that a larger yield could be obtained from certain forests than he had previously estimated.

After his appointment as Inspector-General of Forests, as has been indicated elsewhere, several Conservators with Brandis' assistance undertook the work of conducting linear surveys in other forests of India, upon which preliminary working plans were prepared. For this work later on Brandis was able to avail himself of the services of Schlich and Ribbentrop. This was the beginning of the introduction of simple working plans in India, and gradually, as the number of professionally trained Forest Officers increased, the collection of data and the preparation of working plans on more systematic lines proceeded in various provinces, the chief of which were the North-West Provinces, Punjab, and Burma. The work was, however, still spasmodic and unsystematised, and no control by the Central Authority existed. As a natural outcome, even where plans were in force, deviations were made from them without the sanction of the Central Authority, at the will of the Conservator or of the Divisional Officer. Of course, this state of affairs meant that a plan might be in force for an area and yet remain practically a dead letter. This position came about owing to the decentralisation of the Department in 1882. As we have seen, soon after the formation,

of the Department the officers were placed on one general list, and all forest receipts and charges were Imperial. The Local Governments, under this system, had no direct financial interest in the working of the forests in their provinces, nor in their Forest Officers, who looked to the Inspector-General of Forests for praise and promotion. Under this system control of the young Department and of the working plans in force was fairly efficient. With the decentralisation of the Department the Local Governments had a direct interest in the financial result of the forests within their jurisdiction, and officers showing a good surplus received due recognition in the Resolutions on the Annual Reports. This led in many instances to neglect of the provisions of the working plans in force, and not infrequently to over-exploitation of valuable forests in the interests of revenue production.

In the valuable *sāl* forests in Oudh, for instance, the annual outturn was forestalled for many years. From the Local Government point of view working plans were discredited, and in some cases at least were regarded as unnecessary and a serious infliction on the ryots of the district. This position led Forest Officers to be suspected by their superiors of a tendency or wish to over-exploit their forests, with the object of attaining credit from their Local Governments. Ribbentrop mentions that when in charge of an area of departmentally worked forests in Burma he was suspected of a tendency to over-fell. In explanation he wrote: "As a matter of fact, I was in possession of a more efficient and energetic staff than my predecessors, comprising such officers as Messrs. H. Hill, W. Oliver and Popert, who have all made a name for themselves in the annals of forestry in India, and we gleaned the forests of dead timber that had been left behind, and removed mature trees from the narrow bands (embankments) between paddy (rice) fields; and only increased the outturn from reserves, when detailed enquiry proved this to be admissible."

With these disabilities to be faced, combined with the smallness of the staff and the heavy work involved in settlement and demarcation, the introduction of fire protection and so forth, it is not surprising that at the end of 1884-5 only 109 square miles of reserves under the Government of India were under regularly sanctioned working plans, and but a very small area in Bombay and practically none in Madras.

This being the position of affairs, it became obvious that both the Government of India and the Inspector-General o

Forests were not only unable to maintain the control over the exploitation and management of the forests originally exercised by Brandis in the early days of the Department, but they had actually lost touch with the methods in force, and were thus without direct knowledge of the laxity which they had every reason to fear was making its appearance in some of the provinces. To Schlich is due the credit of putting an end to this retrograde step in the management of the forests. He was Inspector-General at the time, and in 1884 obtained the sanction of the Government of India to his scheme of centralising, in the office of the Inspector-General, the control of the preparation of working plans and the management of the forests under the provisions of these plans. As Ribbentrop rightly says (in his *Forestry in British India*, upon which much of the information in this chapter is based), "This was one of the epoch-making events in our forest history." A working plans' branch which was to be a reality and not merely a name now came into being. The powers of control remained vested in the Inspector-General of Forests, but were largely increased. It would perhaps be difficult to improve on Ribbentrop's description (in 1900) of the progress in the introduction of working plans in India, of which the following is an extract :

"The preparation of working plans continued to be carried out by local agency and under orders of the Local Governments, but under the technical advice of the Inspector-General of Forests, who even after completion criticises each plan and submits it to the Local Governments with a recommendation or otherwise. The Local Governments accept the plans and sanction them if they think fit. Provision was made for cases in which Local Governments disagreed with the instructions issued by the Inspector-General of Forests for a decision by the Government of India. In spite of this, the policy of giving the Inspector-General of Forests such large powers of indirect interference with provincial forest management was severely attacked, but the Government of India remained firm, and wisely so. There have been but few differences, and in no single instance has the Government of India been appealed to. The machinery worked as smoothly as could be desired, and the Government of India, through the Inspector-General of Forests, obtained all the control required over the forest management in the various provinces comprised in the Bengal Presidency.

The progress has been as great as could be expected with the number of officers available for the work. By the end of 1884-5 only 109 square miles were worked under regularly sanctioned working plans. In 1886-7 this area had risen only to 339 square

miles, but by the end of 1897-8 it had increased to 16,536 square miles, and in July, 1899, comprised about 20,000 square miles. The above figures only refer to the Bengal Presidency, where at present (1900) about two-fifths of all reserves are worked under regular detailed working plans. In Bombay and the Madras Presidencies the preparation and control of working plans is entirely local, and there is no technical adviser beyond the Conservator who submits the plans. In the Bombay Presidency regular working plans existed at the end of 1897-8 for 2484 square miles, and were under preparation for an additional area of 3514 square miles. In the Madras Presidency the staff has been too much occupied with forest settlements, and as regards working plans a commencement has but lately been made. At the end of 1897-8 plans existed for only 201 square miles, but were under preparation for another 1101 square miles, and may now be expected to increase rapidly.

Similar progress has been made in the character of our Indian working plans. Some of our earlier plans were over-elaborated, the principle of the weakest link in the chain had frequently been overlooked, and enumeration of the young stock and sometimes of inferior kinds of trees had made them too costly in time and money in comparison with their final prescriptions. The plans, however, which have been prepared during the last eight years are well balanced and practical in every respect. In the Bombay Southern Circle, however, a tendency seems still to exist to carry out the preliminary work in too great detail.

Experience has proved the wisdom of centralising the control of existing working plans in the provinces under the Government of India. At the beginning, especially when a change of officers had taken place, deviations from the provisions of such plans were the order of the day, and were more frequently, than not, carried out without the sanction of the Local Government or even of the Conservator, who under the Forest Department Code is permitted to sanction certain changes. Often such deviations were not even reported, but they were necessarily found out by the Assistant Inspector-General in charge of the Working Plans Branch in the Inspector-General's office, and were promptly brought to the notice of the Conservator of the Local Government; explanations were called for and the authority required for any deviation that might have taken place. By a strict adherence to this policy on the part of the Inspector-General of Forests, the necessity of the due observance of the provisions of regularly sanctioned working plans was gradually recognised, and there is now little to find fault with in this respect. Though, however, the control is now much easier than it was at the outset, the increase in the number of working plans much more than counterbalances this, and the examination of the annual control forms throws a great burden on the Office of the Inspector-General of Forests which year by year becomes a

heavier one. It may at some future time become advisable to decentralise the control or to appoint another gazetted officer to assist the Inspector-General and to materially increase his office establishment.

The possibility of deviation which circumstances may render necessary or advisable has been fully recognised, and ample powers have been conferred on local Conservators to meet it. The rules on the subject stand at present as follows :

'As regards deviations from an approved working plan, not amounting to a revision of the general scheme of management, exploitation in deficit (either as regards material or area) may be permitted on the order of the Conservator, who will, however, subsequently report results to the Local Government, and, in cases where the deviation from the provisions of the working plan is considerable or continuous, obtain the sanction of the Local Government thereto. The previous sanction of the Local Government should, in every case, be obtained when it is proposed to exploit in excess (either as regards material or area)—provided such excess is not caused by the accumulation of balances due to deficit exploitation in previous years—or when it is contemplated to change in any way the character of the exploitation. Conservators may act in anticipation of the Local Government's sanction in the case of fire or other serious accident, or in case of exceptional seed-years, necessitating a sudden change in the plan. Copies of the orders of the Local Government sanctioning such modifications should be forthwith forwarded to the Inspector-General of Forests.'

The Inspector-General is assisted in the work of control by the Superintendent of Working Plans, who is also Assistant Inspector-General of Forests, who is, for special qualifications and merit, drafted from time to time from the various Provincial Lists. The following officers have served in this position :

Mr. J. W. Oliver (Burma List), subsequently Conservator of the School Forest Circle and Director of the Imperial Forest School in 1900.

Mr. R. H. C. Whittall, died as Conservator of the Punjab.

Mr. E. P. Dansey (North-Western Provinces List), subsequently Conservator, Central Circle, North-Western Provinces and Oudh, in 1900.

Mr. E. E. Fernandez (Assam List), subsequently Officiating Conservator, Central Provinces, Northern Circle, in 1900.

Mr. W. E. D'Arcy (Punjab List)—author of a valuable treatise on Working Plans—died as Conservator of the Central Circle, North-Western Provinces and Oudh.

Mr. J. L. Pigott (Assam List), subsequently Conservator of Forests to the Mysore Government in 1900.

Mr. C. G. D. Fordyce (Bengal List), officiated during a three months' vacancy.

Mr. F. Beadon Bryant (North-Western Provinces List), for 3½ years.

Mr. G. S. Hart (Punjab List), officiated during a three months' vacancy.

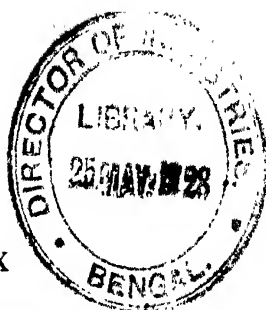
Mr. J. H. Lace (Punjab List), from 22nd February, 1900."

As in other forest services on the continent of Europe, the preparation of working plans requires from the officers entrusted with the work skilled professional knowledge combined with a wide outlook, a grasp of detail and a capacity to appreciate the position and requirements, the susceptibilities and possible opposition of the local and other population to provisions they may wish to incorporate into their plans. Something more than the mere ordinary professional knowledge and training is required to produce the good working plans officer, even when a certain period of service has given him the essential experience and knowledge of the inhabitants of the country—always a first necessity in India.

Such being the requirements, it is not surprising that with a recognition on the part of the Local Governments of the very great importance of this work, officers were picked to act as Working Plans Officers in charge of the preparation of plans for certain forest areas, and when necessary, junior trained officers from the Imperial Branch were selected to serve as their Assistants. Further, owing to the arduous nature of the work and its importance, staff pay was awarded to the officers engaged upon it. By the end of the period here dealt with selection as Working Plans Officer became regarded as the blue riband of the various local forest services in the provinces, the only possibility open at this period to the Forest Officer below the rank of Conservator of getting away for a time from ordinary divisional routine. To the smart junior, selection as Assistant on working plans, provided he fulfilled the promise of his selection, meant early distinction amongst his fellows.

For at this time research and the Research Institute and the Staff appointments which were to come in their train had scarcely reached the stage of academic discussion; whilst the Dehra Forest School appointments as Instructors did not, many Forest Officers felt, lead in the direction they wished to follow.





CHAPTER XX

INDIAN FOREST LITERATURE AND RESEARCH, 1850-1900

THE century which had elapsed since the British first began to institute enquiries into the value (from a timber-producing point of view) of the southern forests of the country was extraordinarily meagre in the production of a forest literature dealing with the Indian forests. Numerous official reports connected with the forests of the country were drawn up, but these were not available to the public nor generally to the officers of the Department after its formation. Those in authority saw and read them, and they then followed the usual fate of such documents and were filed and pigeon-holed. The only book dealing with the early days of Forest Conservancy which apparently became available to the public was Cleghorn's *Forests and Gardens of Southern India*, published in 1861. This book to a certain extent dealt with forestry matters and problems, for it was a description of the author's tours in the forests of the Madras Presidency, and forms a valuable record of the period (1856 to 1859) for which it was written.

A book of great interest and value to the Forester on the eastern side of India is Hooker's *Himalayan Journal*, published at much the same time.

With these exceptions the early books at all relating to the forests were botanical in nature, such as Balfour's *Timber Trees, Timber and Fancy Woods of India*, Colonel Beddome's *Flora Sylvatica of Southern India and Ceylon*, and Sulpiz Kurz's *Forest Flora of Lower Burma*.

Later, Brandis published his *Forest Flora of North-West and Central India*. Then came Gamble's *List of Trees, Shrubs and Large Climbers found in the Darjiling District, Bengal*, Talbot's *Systematic List of the Trees, Shrubs and Woody Climbers of the Bombay Presidency*, and Gamble's *Bambuseae of British India*, and one of the most useful and practical books of all for general use by the Forest Officers throughout India, Gamble's

Manual of Indian Timbers. Last of all appeared Babu Upendra Nath Kanjilal's *Forest Flora of the School Circle, North-West Provinces*.

These books on the forest flora were indispensable and an inestimable boon to Forest Officers. For until they appeared, it was impossible to refer to the various species with accuracy; for native terms for the species could not be relied upon and often varied in different parts of the same province or range of mountains, as e.g. in the Western Himalaya, for the same species of tree. Thus to enable the Forest Officer to write and report upon the species of his forests an authoritative botanical nomenclature was a *sine qua non*.

Outside the botany of the forest a handful of books dealing with purely Indian forestry subjects was all that appeared. This handful is represented by the following:

Ribbentrop's *Hints on Arboriculture in the Punjab: intended for the use of District and Forest Officers*.

B. H. Baden-Powell's *Forest Law*, a standard work of great usefulness to the Forest Officer.

Fernandez's *Manual of Indian Sylviculture*, and the same author's *Notes on Forest Utilisation*, both useful books at the time of their appearance. D'Arcy's *Preparation of Forest Working Plans in India*, a book of great merit and value to the Forest Officer, which ran into a second edition and is still in use in a revised form.

W. R. Fisher's *Manual of Indian Forest Botany*; Clifford's *Notes on Forest Zoology*; Heinig's *Glossary of Botanical Terms*; and Stebbing's *Injurious Insects of Indian Forests*.

A few elementary manuals and lecture notes were written and published for the use of the students at the Dehra Dun Forest School.

One of the most valuable literary departures made during the period was the inauguration of a monthly Departmental Magazine in 1875 to which the title of *Indian Forester* was given. This magazine was started by Schlich, the first Honorary Editor, who was at the time Conservator of Forests in Bengal with head-quarters at Darjiling. Twenty-four volumes of this valuable periodical made their appearance during the period under the Honorary Editorship of the following Conservators of Forest: Sir W. Schlich, J. Sykes Gamble, W. R. Fisher, E. E. Fernandez and J. Sykes Gamble to the close of the century.

The *Indian Forester* was first edited at the head-quarters

of its first two Editors, Datjiling, being then transferred to Dehra Dun.

The conception of issuing a monthly magazine dealing with forestry matters, Indian, British Empire and foreign nations, was a brilliant one. During the twenty-four years the magazine had its ups and downs. For it was no easy matter to keep a journal of this kind going month by month. For a period it lapsed into a quarterly, to return fortunately to the monthly issue. The Indian Forest Officers were overburdened with work, and to many of them the pen did not come easily. In those palmy days of Indian sport the hand of the Forest Officer more readily grasped the stock of a rifle than his fingers a pen! What a gold mine of information and experience was lost thereby to the Department is perhaps better realised at the present day than it was at the time. But in spite of all vicissitudes the *Indian Forester* remains a record, an incomplete record, but still a record of the achievements and disappointments, of the hopes and fears, of mistakes and successes experienced by the Department during this considerable period. It is a mine of information and for the diligent and industrious reader there is a great deal to be learnt from its pages.

Had the century given birth to no other literary achievement than the *Indian Forester*, which, as has been shown, was by no means the case, it would not have been barren of literary effort.

In 1892 the Inspector-General of Forests, with the sanction of the Government of India, added what was known as an Appendix Series, or *Stray Leaves from Indian Forests*, to the *Indian Forester*. The expenses of the latter magazine were entirely defrayed by the officers of the Department themselves, no grant towards its maintenance being made by Government. Realising the value to the Department of the magazine the Government agreed to Ribbentrop's recommendation that papers and monographs of a professional or scientific interest to Foresters on the subject of India and other parts of the world should be issued in the Appendix Series, the costs of publishing the series being defrayed by Government. This in reality constituted the first step on the part of Government towards encouraging the preparation of original papers dealing with questions of first importance, such as the silviculture of the Indian species of trees, and so forth. It remained the only step in this direction taken by Government during the period

But it was a very valuable one. It is true that a considerable proportion of the papers published in the Appendix Series during the period dealt with descriptions of European continental forests and forestry systems, silviculture, and so forth. And that the persistence in this somewhat narrow groove at the expense of papers dealing with purely Indian forestry undoubtedly delayed the advance for a time of Indian silviculture and Indian forestry generally. But in defence of the Indian Forest Officers of the time it should be pointed out that a considerable proportion of the senior officers were not professionally trained men. They consisted of Army officers and others who had been recruited to start the new Department. When the preliminary spade-work of demarcation, survey and settlement, fire protection and rough enumerations of the contents of the forests, and so forth, had been accomplished by these men, they took advantage of the offer of the Government permitting officers to spend a portion of their furlough visiting European continental forests, chiefly German and French, and the results of these visits were in many cases published in the Appendix Series in the form of descriptive papers on the forest management studied in these countries, so as to be of use to their confrères of the Indian service. But it is open to doubt whether this path was not pursued far too long by their successors, the fully trained men; for it is certain that it had not occurred to the majority of these latter that a closer and more detailed study of forests in other parts of India of similar species to those of the localities in which they had been working, even if a portion of their furlough was devoted to the work, would have more rapidly advanced the progress of Indian forestry than a persistent study of the comparatively small areas and details, admittedly brought to a high degree of efficiency on the continent of Europe, useful as these undeniably were and are.

Although written during the period, from studies made over a series of years, it is not until the issue of the Appendix Series with the twenty-fifth volume of the *Indian Forester* that we find a set of papers devoted to Indian silviculture, such as "Notes on the Regeneration of the Sâl," by S. Eardley Wilmot; "Notes on Sâl Forests," by the same author; "Notes on Improvement Fellings in Sâl Forests," by the same author; "Sâl-coppice Forests of Oudh," by the same author; "Notes on the Treatment of Shisham and Khair Forests in the Sub-Himalayan Tracts," by the same author; "On the Deodar in the Hill

Forests of North India," by B. Ribbentrop; "On the Sandal Tree of Southern India," by P. M. Lushington.

But many useful papers, especially on economic products, were published with the volumes XVIII to XXIV.

Two papers appeared (as supplements to the magazine) earlier and may have originated the idea of the Appendix Series. These were a paper on "Sandal Wood," by D. E. Hutchins (Vol. X) and one on "A Botanical Tour in Merwara in 1886," by J. Duthie (Vol. XII).

The papers dealing with Indian subjects published with Volumes XVIII to XXIV were as follows:

Vol. XVIII.—"Reports on the Seaborne Trade in Timbers of Burma," by E. J. Branthwaite; "Indian Woods for Tea Boxes" (also Vol. XIX); "Lac" (also Vol. XIX); "Padauk Wood," by E. Thurston; "Podophyllum," by E. Thurston.

Vol. XIX.—"Albizia Lebbek (Indian Walnut)"; "Bhabar (sabai) Grass and the Trade in it," by J. S. Gamble; "Blackwood" (also Vol. XX); "Kamela Dye"; "Economic Forest Products"; "Indian-Rubber from *Ficus elastica*"; "Rhea Fibre and Fibres for Brush-making," E. Thurston; "Gum of *Prunus communis* and *P. Puddum*"; "Resin and Turpentine from Indian Pines"; "Tans of Southern India," by E. Thurston; "Note on the Seaborne Timber Trade from Tenasserim," C. T. Bingham.

Vol. XX.—"Chaulmugra Oil"; "Garjan or Kanyin Oil"; "In or Eng Oil."

Vol. XXII.—"Note on the Goalpara Division in Assam," by T. J. Campbell.

Vol. XXIV.—"Acacia catechu."

It will be perceived that the officers of the Department had thus made a beginning in the publication of a forest literature, not only for India, but for the British Empire. For outside India, at this period there was little British Empire forestry literature. Sir D. Hutchins, Conservator of Cape Colony, was an exception. In Britain forest literature had been almost dead for a century or two. Books and magazines on arboriculture and horticulture appeared; but of a forestry literature *qua* forestry literature, if we except a textbook, Schlich's excellent *Manual of Forestry*, there was almost a complete absence.

Reference must be made, however, to the *Journal* of the Royal Scottish Arboricultural Society, which contained many

excellent articles on forestry, including several papers on Indian forestry by Cleghorn, Temple, Brandis and Bailey and others. The *Transactions* of the Royal Society of Arts during the period also contained papers read by members and others on matters relating to forestry; and scattered papers appeared in the *Transactions* of one or two other Societies.

RESEARCH WORK

Of research work in forestry, as the term is understood at the present day in India and was so understood on the continent of Europe during the period, with the exception of botany, little was accomplished. The Department was slow and the Government of India still slower in recognising the enormous advantages which research work would have in the progress and development of the incalculable potential value of the Indian forests. Research work in its purely scientific side was mainly confined to botany, and the very greatest credit should be awarded to those officers, of whom Brandis and Gamble stand in the forefront, for the manner in which they took up the study of forest botany and combined this study with their own absorbing professional work. They were great Foresters, but they also became great botanists with scientific reputations. Messrs. J. H. Lace and H. H. Haines were also excellent botanists and expert foresters.

Ribbentrop, in writing of the controversy already alluded to (p. 502) on the position of botany in forestry education (in *Forestry of British India*), referred as follows (1900) to this botanical work: "It is essential and of great advantage that the Forest Department in India should occasionally produce an eminent scientist. It gives a certain tone to the Department as regards the world at large, which cannot be obtained in any other way. Men like Sir Dietrich Brandis and Mr. Gamble are eminent Foresters and administrators, as well as eminent scientists, but such combinations are very rare, and I know of no others in the history of the Department who could share this distinction to the same degree, and of no other botanist who has left a permanent mark on the organisation and development of the Department to an even approaching extent. I agree with Dr. Schlich that the ordinary man when introduced to practical forest work in India finds no time for special botanical study. The special study of botany is, moreover, not necessary to, nor can it ensure a knowledge in silviculture, and most of those already

named as founders of the present Department and scores of our best sylviculturists, amenagists and administrators generally—such as (I may be permitted to cite a few amongst many who, I am happy to say, exist) Hill, Eardley Wilmot, Popert, Oliver, Carter, Fernandez, Bagshawe, Wroughton, Beadon, Bryant, etc. etc.—can raise no claim to be botanists in a wider sense than to be able to utilise the knowledge of professional botanists which must always be the foundation of much of our work. Nevertheless, the study of botany and other sciences auxiliary to forestry is fully encouraged in the Indian Forest Department, sometimes even at an administrative sacrifice, and we have men, such as Messrs. Talbot, Lace, McDonell and Stebbing, for instance, who neglect neither the one nor the other.”

Of research work in its accepted sense in other branches of forestry (sylviculture and botany have been already alluded to) little was done by the Department itself. Allusion must, however, be made to two directions in which work of this nature was being carried on.

In November, 1879, Dr. Warth was appointed as an Assistant Conservator on the School Staff, and remained on the Staff till 1889, when he went on leave and did not return. He was apparently Instructor in physical science and had a small chemical laboratory for research work. There does not appear to be much on record as to the work he was engaged upon. One reference, however, is to be found in the pages of the *Indian Forester* (Vol. VII, p. 188, 1881). It refers to a Report written by Dr. Warth on the utilisation of the less valuable woods of the forests, for which no ready sale existed, in the manufacture of charcoal for iron smelting. The result of Warth's investigations was unfavourable, for he concluded his Report by saying, “To give a reasonable hope of success there must be a permanent supply of cheap charcoal, good ore and lime in plenty on the spot, as well as ample and willing labour, and the locality selected should not be too near the seaports, whence English iron comes, nor should it be far from a considerable market.” The reviewer of the Report says it would be wonderful if a locality uniting all these conditions could be found, and therefore feared that the idea would have to be given up. Yet he realises the soundness of the idea, for he adds: “This is a pity, for the idea is evidently a good one, and any manufacture which would utilise the class of trees referred to would be of great assistance in the amelioration

of the stock of timber in our forests." He also remarks that it would not be easy to induce the native to use the inferior species of trees for charcoal making, instancing the native iron smelters in Chota Nagpur who always utilised sâl for charcoal making.

This is probably the first instance of a piece of economic forest research work having been carried out in India. It is also interesting to observe that even at this comparatively early date in the life of the Department the importance of removing and utilising the inferior species with the direct object of sylviculturally improving the forest crop had become fully recognised.

Subsequently Dr. Walter Leather was appointed Agricultural Chemist to the Government of India with head-quarters at Dehra, and gave instructions in physical science to the Forest School Students. It is not apparent, however, that he conducted any research work for the Department during the period.

The appointment of a Reporter on Economic Products to the Government of India was created in 1887, and Dr. (now Sir George) Watt, C.I.E., was gazetted to the post. His duties were to institute enquiries into the economic products of the country with the object of discovering new products of commercial or medicinal value. Memoranda were drawn up on the products and issued from time to time. The great result of Watt's work was the publication by the Government of India of the *Dictionary of Economic Products*, upon which work he was already engaged at the time of his appointment. The Reporter was authorised to communicate direct with Conservators of Forests in order that the economic products of the forests might be included in his researches and find a place in the dictionary. The officers of the Department co-operated indefatigably with Dr. Watt, and a very considerable amount of valuable information upon forest products had been collected by the end of the century—researches which were to become very valuable and to form a foundation upon which to build when the Forest Research Institute came into being in the early years of the twentieth century, as will be described in the succeeding volume.

The other branch of research work which received some meed of recognition during the period here under review was that of forest entomology. The possibility of making a commencement in this direction eventuated with the appoint-

ment, in 1884, of Mr. E. C. Cotes to the charge of the Entomological Section of the Indian Museum at Calcutta. Mr. Cotes took up the rearrangement, identification and cataloguing of the insect collections in the museum, in which work he was assisted by Mr. L. de Niceville, Colonel Charles Swinhoe and many others, including British and foreign scientists in Europe and America. In 1888 Cotes undertook, at the suggestion of Sir Edward Buck, an investigation on the subject of the attacks of the wheat and rice weevil of India. The results attained were published; but as an outcome it was realised that some further organisation would be required to cope with so large an investigation as that of the insects attacking crops in India. On the suggestion of Sir Edward Buck the matter was taken up by the Trustees of the Indian Museum, and it was ultimately decided to make the investigation of the economic entomology of India a regular feature of the work of the Entomological Section of the Museum, the results to be published as materials accumulated in the form of a periodical to be entitled *Indian Museum Notes*, which would be issued by the Trustees under the authority of the Government of India. Funds for the purpose were furnished by the Government of India to provide for a small staff, for the publication of the *Notes*, and incidental purposes. This departure met with instant response on the part of all the Directors of Land Records and Agriculture in the different provinces, and the co-operation of all officials and others interested in agriculture throughout India was invited. As a result a stream of Reports, accompanied by specimens, began to arrive at the Museum. Since a knowledge of how to collect and pack insect pests, and how to carry out observations was necessarily absent for the most part, much of the information sent in was of a fragmentary character (as often, on arrival, were the specimens and insects sent). In spite of this, a great deal of valuable information was compiled and issued in the four volumes, each of several parts, published between 1889 and the close of the century.

At the request of the Inspector-General the new departure was extended to the Forest Department, Mr. Cotes undertaking to obtain the identification of specimens forwarded to him by officers of the Department, and to furnish such information with reference to the pests as might prove possible. At this date there was a complete absence of all knowledge on the subject of the insect pests of the Indian forests. The

first practical beginnings of research work into forest insects commenced with Mr. Cotes, assisted by Forest Officers.

By the end of the century a number of Memoranda, on forest insect pests, mostly of a brief nature, had been published in the *Notes* scattered throughout the four volumes. In some cases they referred to the few Reports on insect attacks which had previously appeared in the pages of the *Indian Forester*.

It had become evident to Ribbentrop, the Inspector-General, that if progress was to be made into the great field of investigation into forest insect pests, the Department would have to take up the work itself. This is apparent from the following extract from *Forestry in British India* :

"It must be acknowledged that the Indian Forest Department has contributed a large share to the development of an English forest literature, but as yet we have no comprehensive books, either on insects injurious to forest growth, or diseases of forest plants. These wants are most important. We have had already indications that insects may do widespread damage to our Indian forests, and as, under our present management, the intermixture of our most valuable trees becomes more and more pronounced, and in many instances will lead us to the establishment of large areas of more or less pure forests, this danger from insects may, and probably will, become more intense in the future. For this we should become fully prepared and armed. During the last year, for the first time, Mr. Stebbing, a Forest Officer in Bengal, compiled a manual of all that had so far been published as regards injurious insects. This I circulated amongst Forest Officers, with an appeal for assistance in collecting specimens and data for the life-history of the various injurious insects. The result has so far been very gratifying, and with the necessary assistance it is hoped that the foundation will soon be laid of a practical and valuable work. The importance of this science to Indian forestry has never been entirely recognised at its full value, and it is only of late that more concentrated and widespread attention has been paid to the life-history of our injurious insects. I took the opportunity of Mr. Stebbing's knowledge and taste in this respect of starting the organisation of Departmental Researches."

The reference here made by Ribbentrop was to his suggestion to the Government of India that a research post of Forest

Entomologist should be created, the occupant, a Forest Officer, to be under the orders of the Inspector-General. He was to be relieved of all executive forest duties, and to give his whole time to a study of the insect pests of the forests. This proposal found warm support from Mr. T. W. Holderness (now Sir Thomas Holderness, Bart., G.C.B.), at the time Revenue Secretary to the Government of India, and was sanctioned by the Governor-General in Council and the Secretary of State. The author was appointed to this post at the close of the period here reviewed. It was the foundation-stone on which a great edifice was to arise in the course of the next two decades.

The writer would offer an apology for having to refer to himself in this history. It appeared unavoidable, however, if the credit of initiating the first forest research post held by a Forest Officer in India was to be allocated to the originator of the idea, Ribbentrop. Moreover, there were three senior Forest Officers in the Department at the time, Colonel C. T. Bingham and Messrs. Wroughton, subsequently Inspector-General for a short period, and T. R. D. Bell, who had been engaged on entomological collection work of value for a considerable period, and whose work was well known, both at the Indian Museum and the Natural History Museum in London.

The Department would wish to place on record the great assistance in Forestry Botanical Research which has always been accorded to it by the Officers of the Royal Botanic Gardens at Calcutta and Kew. During the period dealt with in this volume the work performed was of the greatest value to the progress of forest conservancy.

CHAPTER XXI

AN APPRECIATION OF THREE INSPECTORS-GENERAL OF FORESTS, 1863-1900

THIS volume may perhaps be fitly concluded by quoting the Government of India's farewell Notifications to the three Inspectors-General of Forest, Brandis, Schlich and Ribbentrop, who had introduced, and placed on a firm basis, Forest Conservancy in India between 1863 and 1900.

The valedictory address to Brandis is as follows :

" FORESTS

No. 407 F.

1st May, 1883.

His Excellency the Governor-General in Council desires to place upon public record his recognition of the eminent services rendered to the State by Mr. D. Brandis, Ph.D., C.I.E., Inspector-General of Forests to the Government of India, who has left India with the intention of retiring from the service of Government.

Mr. Brandis has served in the Forest Department since January, 1856, and has for the last nineteen years been Inspector-General of Forests to the Government of India. During this long period he has laboured incessantly and successfully to perfect the organisation and working of the Department in all parts of the country, and under his able administration the forest revenues have risen from 35 to 95 lacs of rupees. The directions and instructions embodied in his numerous Inspection Reports and Reviews will for many years to come form the standard manuals for the practical guidance of Forest Officers. It is hoped that after his retirement Mr. Brandis will supplement the services he has rendered to the cause of forest education in this country by assisting the Government at home to place the training of candidates for the superior staff of the Department upon a sound and permanent basis. The warmest thanks of the Government of India are due, and are hereby tendered, to Mr. Brandis."

THREE INSPECTORS-GENERAL OF FORESTS 613

The farewell address to Schlich, No. 130 F, is dated Calcutta, 7th February, 1889, and is in the following terms :

“ In notifying Dr. W. Schlich's retirement from the Forest Department, the Governor-General in Council desires to place on record an acknowledgment of Dr. Schlich's valuable and distinguished services both in organising the Forest Administration in Sind and Bengal and in developing the Imperial Department as Inspector-General of Forests.

Dr. Schlich's labours to perfect the technical education of the Forest Staff deserve special notice. To him is to a great extent due the credit of having established on a satisfactory and practical basis the School at Dehra for the instruction of the Executive Forest Staff, and to a still greater extent that of having organised the Forest Branch of the College at Cooper's Hill for the education of the Controlling Staff. It is a satisfaction to the Government of India to know that Dr. Schlich's retirement does not sever all connection between him and this country, and that, as Principal Professor of Forestry in Cooper's Hill College he will still continue to exercise a useful influence over the Forest Departments of India.”

To the four years of Schlich's Inspector-Generalship the Department owe several important measures :

- (1) The reorganisation of the Controlling Staff to relieve the serious block in promotion which had prevailed.
- (2) The formation of the Imperial Working Plans Branch.
- (3) A revised edition (3rd) of the Indian Forest Code.
- (4) The imperialisation and reorganisation of the Dehra Dun Forest School.

The valedictory address to Ribbentrop reads as follows :

“ No. 3655-224.

Mr. B. Ribbentrop, C.I.E., Inspector-General of Forests, is permitted to retire from the service of Government with effect from the 1st November, 1900.

In notifying the retirement of Mr. B. Ribbentrop, C.I.E., from the Forest Department, the Governor-General in Council desires to place upon record his recognition of the eminent service rendered to the State by that officer over a period of nearly thirty-four years.

During the last fifteen years of them the Government of India have had the benefit of Mr. Ribbentrop's services as their Inspector-General, during which time he has with great

skill and judgment, and with indefatigable industry, guided and superintended extensive and far-reaching changes in the organisation of the Forest Department, carrying on the work of his predecessors in building up a Provincial Forest Service, recruited and trained in the country, and in enlarging the scope and usefulness of the School of Forestry at Dehra. He has laboured to bring the forests under closer and more methodical treatment, and to that end he has done much to improve the system of working plans, both in their preparation and also in their subsequent operation. His frequent tours of inspection in all parts of India, and the wise professional advice which has invariably accompanied them, have been instrumental in a high degree to the progress of scientific forestry and to the growth of the forest revenues. During his term of office, the gross revenues of the forests have risen from 102 lacs of rupees in 1884-5 to 190 lacs in 1898-9, and the net surplus from 31 lacs to 90 lacs of rupees. He hands over to his successor a great forest estate, valuable in the present and likely to be still more valuable in the not far distant future, which his labours have done much to place in its present secure position.

Mr. Ribbentrop retires, having earned the sincere thanks of the Government of India for his long and meritorious service."

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Mr. Ribbentrop retires, having earned the sincere thanks of the Government of India for his long and meritorious service."

GLOSSARY

GLOSSARY OF INDIAN WORDS

Ahirs=Cattlemen

Babul=*Acacia arabica*

Ban oak=*Quercus incana*

Banskuttee mehal=Tract of forest in which Government possessed the right to cut bamboos and other growth

Bar rakh=Waste land watered by rain

Beega (Bigha)= $\frac{1}{8}$ acre

Beega (Bigha)= $\frac{1}{8}$ acre (Bengal)

Bélah= a gum or varnish

Ber=*Zizyphus jujuba*

Candies=One candy= $15\frac{1}{4}$ cubic feet

Cawnies= $1\frac{1}{4}$ acres

Chetty=A Karnāta Sūdra (caste); a weaver by caste or occupation

Chir=*Pinus longifolia*

Chos=Eroded cultivated land or eroded area

Chowker=A Bengal market measurement of timber in 1860-70

Chowkees=A toll-station; a guard or watch

Chuprassi=Orderly or messenger

Darogah=Sub-inspector of police; chief police officer of a village.

The same title was at first given to subordinate forest officers occupying a similar status

Doker=A Bengal market measurement of timber in 1860-70

Dooli=A palanquin

Dhák=*Butea frondosa*

Dhya=Shifting cultivation (Central Provinces and North-West Provinces)

Ghât=Landing stage or depôt on river bank

Ghâts=Mountain ranges (crests) in Bombay and Madras

Ghâtwal=One who has charge of a mountain pass or a landing place on a river

Ghâtwalee mouzahs=A place, village or district where a Ghâtwal is stationed

Gowlees=Cattlemen

Hath= $1\frac{1}{4}$ feet

Jagheer or Jaghir=Land grant

Jemadar=Indian native commissioned officer

Jhum=Shifting cultivation (Bengal and Assam)

Jody=A grant of land to be held in payment of quit-rent

Jow or Jhau (Sind)=*Tamarix dioica*

Kadam=*Nauclea cadamba*

Kahs=Revenue collected direct by Government

Keel=Shifting cultivation (Western Himalaya)

Khadir lands=Low-lying or alluvial lands

Khair=*Acacia Catechu*

Kharshu oak=*Quercus semecarpifolia*

Khas=Government-owned estates (Bengal and parts of Assam)

Khan, or Khas, Tehsil or Tahsil=Revenue collected direct by Government

Kikur=*Acacia arabica*

Kooruns=Government lands

Kumri=Shifting cultivation (Madras and Bombay)

Kutchra road=Mud or rough road

Lac=Lakh=1,00,000 rupees

Malgoozaree=Lands paying revenue to Government

Mamlutdar or Manlatdar=Officer in charge of local Revenue charge

Maund=80 lbs ; 27 maunds=1 ton=45 cubic feet

Meerasdars=The holder of a heritage ; proprietor of land

Mehal or Mahal or Mohal=Quarter of a town or village—a district

Mohwa or Mowah=*Bassia latifolia*

Mooza or Mauzah=A place, village ; cultivated lands of village

Moru oak=*Quercus dilatata*

Nim=*Melia indica*

Peon=Orderly or messenger

Pergunnah or Pergannah=Civil division of a district

Picotta=A machine or contrivance for raising water for irrigation purposes

Purwannah or Parwana=Order ; Imperial writ

Pyinkado or Pyingado=*Xylia dolabriformis*

Raiyat=Peasant

Rejbahas or Rājbahā=Branches or "leaders" from main canal

Rukh=Waste land (Punjab)

Ryot=Peasant

Sailaba lands=Lands watered by inundations

Sérnul or Simul=*Bombax malabaricum*

Shrotriendar=The holder of land at a favourable rental for duties discharged

Sissoo or Sissu=*Dalbergia Sissoo*

Sudder (Station)=The chief station of a district

Talook=Tenure

Talooka=A revenue sub-division of a district

Talookdar or Taluqdar=A revenue farmer

Taluk or Taluq=Tenure

Tamarind=*Tamarindus indica*

Tehseel or Tahsil=A local Revenue charge

Tehsildar or Tahsildar=Officer in charge of a local Revenue charge

Thanna or Thana=Police Station or district charge

Tickadar=Contractor

Toon or tun=*Cedrela Toona*

Tope=Clump or grove of trees

Toungya=Shifting cultivation (Burma)

Wurkus or Warkas land=Land only suited to the cultivation of inferior grains or crops

Ya=Area cleared for shifting cultivation (Burma)

Zemindar=A Revenue farmer or landowner

Zemindary=Area of land or estate owned by a Zemindar

INDEX

- Bengal, issue of Circular by Conservator, calling for information on Bengal Forests, 1864, 378
 Bengal, permanent settlement and the forests, 419
 Bengal, plantations in, 425
 Bengal, proposals for Conservancy in British Sikkim, 1865, 371, 374, 375
 Bengal, sleepers from temperate forests for East Indian Railway, 406
 Bengal, Tista Valley sal forests, 373
 Bengal, unequal distribution of the forests, 424
 Bengal, valuation surveys to be commenced in forests, 1870, 425
 Bengal, waste of timber in the Duars, 414
 Berar, progress of Conservancy in, 1865-70, 252
 Berar, demarcation of reserves in, 253
 Berar, financial results of forests in, 252, 254
 Berar Forest Law of 1886, 473
 Bhagalpur Division, forests in, 378, 424
 Bhagaruttee Forests, the, 333, 351
 Bhutan, frontier war in, 372
 Bhutan, sal forests of, 373, 405, 411, 413, 418, 420, 425
 Bhutan, war with, 4, 372
 Bombay and Brandis' proposals for training the staff, 169, 170
 Bombay, attitude of Collectors towards Forest Conservancy, 134
 Bombay, demarcation of forests in, 135, 140, 157, 161
 Bombay, departmental working of forests in, 163
 Bombay, financial position of forests, 137, 153, 164
 Bombay, Forest Offences in, 139
 Bombay, formation of plantations for fuel, 141, 153, 165
 Bombay, fuel in, 140
 Bombay, license system in forest, 154, 165
 Bombay, Memorandum on position of forests by Brandis, 155
 Bombay, pay of subordinate establishment in, 137, 170
 Bombay, powers of Conservator in, 151, 156
 Bombay, progress of Conservancy in, 1865-70, 134
 Bombay, railways and fuel supplies, 141-151
 Bombay, Report on Forests of, from 1868-9, 151
 Bombay, teak plantations in, 139, 140
 Bombay, training of probationers for, 49, 65
 Bombay village, forests reserves in, 136
 Bombay, visit by Brandis to Forests of, 162
 Boom across the Ganges, attempt to lay, 306
 Bori Forest, fire protection started in the, 224, 242, 248
 Botanic Gardens, Calcutta and Kew, assistance received from, 611
 Boundary marks, trees as, 94
 Brandis, appointed Inspector-General of Forests, 4
 Brandis, decision on control of canal plantations, 308
 Brandis' management of Burma Forests attacked, 181
 Brandis, Memorandum on Bombay Forests, 1868, 155
 Brandis, Memorandum on supply of sleepers from the North-West Provinces, 311
 Brandis' proposals for permanent recruitment of Department with trained probationers, 54
 Brandis' proposals for training Indian Forest probationers, 42
 Brandis reports against return to license system, 183
 Brandis reports on girdling trees, 26, 28
 Brandis, results of his working plan for Burma teak forests, 1856-68, 198
 Brandis, valuation surveys made in Oudh by, 353
 Brandis visits Bengal Forests in 1862, 371
 Brandis visits Berar Forests, 1869, 254
 Brandis visits Bombay Forests, 1870, 162
 Brandis visits Madras in 1881, 472
 Brandis visits Mysore Forests in 1869, 131
 Brandis visits Sind Forests in 1867-8, 174
 Brandis' work in India, importance of, 417
 Budget Estimates, Provincial, 1868-9, 20
 Budget Estimates, Provincial, 1870-1, 34

Buildings and Communications, progress in, 518
Burckhardt, Forest Director, Hanover, 54, 71
Burdwan Division, forests of, 383
Burma, blasting operations in streams, 197
Burma, Brandis' management of forests attacked, 181
Burma, division of the forests, 201
Burma, Financial Results of forests, 192, 199
Burma, financial statement of forests, 1868-9 and 1869-70, 213
Burma Forest Reports, 1868-9, 1869-70, by Seaton, 201, 213
Burma, Forest Staff in 1868 and 1870, 200, 214
Burma, progress of Conservancy in, 1865-70, 181
Burma, progress of forest demarcation, 186, 191, 194, 201, 203
Burma, proposal to revert to license system, 181
Burma, results of teak operations between 1856-7 and 1867-8, 198
Burma, rights of villagers to forest produce, 205
Burma, teak plantation in, 191, 195, 196, 197, 200, 206, 209, 565, 567
Burma, the license holders in the Attaran Forests, 187-191
Burma, timber station at Kaddo, 186
Burma, toungya cultivation in, 201
Burma, Upper and Lower, united into a province, 1897, 454
Burma, Upper, annexed, 1886, 454
Burma, Upper, Forest Regulation VI of, 1887 and 1898, 474
Burma, Upper, settlement of method of exploiting the teak forests, 512
Burma, yield of teak timber, 192, 199
Burmese War, the third, 1885, 453
Bushahr State Forests, lease of, 256

C

Cachar District, forests of, 398
Canal plantations, 286, 307
Casuarina plantations in Madras, 93, 95, 564, 567
Census of India, the first general, 1881, 451
Central Provinces, absence of communications in the 'sixties, 221
Central Provinces, arboriculture in, 248
Central Provinces, demarcation work in, 235, 240, 241

Central Provinces, destruction of the teak forests in, 222
Central Provinces, division of forests in, 227, 231, 234
Central Provinces, "dhya" cultivation in, 221
Central Provinces, effect of advent of railway on the forests, 246
Central Provinces, exploration of forests and settlement work, 216, 241
Central Provinces, financial results, 229, 231, 243, 249
Central Provinces, fire protection commenced in, 223, 242, 248
Central Provinces, Forest Report for 1864-5, 225
Central Provinces, Forest Staff of, 235
Central Provinces, population of, 216
Central Provinces, progress of administration in 1865-70, 215, 246
Central Provinces, reorganisation of Department, 226
Central Provinces, surveys of forests commenced, 241
Central Provinces, teak plantations in, 230, 240, 248, 250, 564
Central Provinces, unreserved forests in, 243, 251
Chakrata and Deoban Hill Forests, 335, 338
Chakrata Cantonment, wood for building the, 335, 338
Chamba deodar forests, estimated deodar supplies from, in 1866, 264-270, 272
Chamba State Forests, lease of, 255
Chittagong District and Hill Tracts Forests, 403, 423, 432-442
Chittagong teak plantation at Kap-tai, 572
Chota Nagpur Division, forests of the, 391
Cinchona, cultivation of, 118, 196, 371, 375
Circle, a Conservator's charge, 486
Cleghorn and the Punjab Forests, 7
Cleghorn and the Punjab Himalayan Forests, 255
Cleghorn and training of forest probationers, 69, 72, 74
Cleghorn, Dr., the Founder of Forest Conservancy in India, 7
Cleghorn, officiating Inspector-General of Forests, 228
Coimbatore and provision of fuel, 99
Commissioners of Forests, Brandis and Cleghorn appointed, 7

Communications and Buildings, progress in, 518
 Conolly teak plantations, progress of, 112, 563, 566
 Conservators, work and powers of, 496
 Cooper's Hill Engineering College, inauguration of training of probationers at, 500
 Coorg, progress of forest administration, 123
 Coorg, Reports on forests of, 129
 Cotes, Mr. E. C., Economic Entomologist at Indian Museum, Calcutta, 609
 Creeper cutting in Oudh Forests, 354, 363
 Creepers in the Indian Forests, 561
Cryptomeria japonica in Darjiling, 377
 Cuttack, forests in Tributary Mehals, 387

D

Dacca Division, forests of the, 395
 Dacca, the city of, in 1870, 432
 Dalzell, Conservator, in Bombay, 135, 137, 146, 152, 169
 Darjiling District, forests of, 378, 405
 Darjiling municipality and Goom Pahar Forests, 376, 422
 Davis, Mr., first appointment to Bengal Forests, 418
 Demarcation and exploring of forests, arduous nature of work of, 193
 Demarcation of forests in India, 478
 Deodar, excess fellings of, in the Chenab Forests, 276
 Deodar, growth of, 337, 343
 Deodar plantations, 262, 272, 277
 Deodar plantations in the Western Himalaya, 570
 Deodar, price of, in Punjab in 1866, etc., 267, 273, 280
 Deodar, seeding of, 277
 Departmental working in the North-West Provinces Forests, Brandis on 313, 363
 "Dhya" cultivation in the Central Provinces, 221
 "Dhya" cultivation in the North-West Provinces, 298
 District Boards, formation of, 451
 Divisions, Forest, staff of, 497
 Doveton, Lieutenant, Forest Officer in the Central Provinces, 224, 242, 246, 248

Dufferin, Earl of, Viceroy and Governor-General, 452
 Dun, Dehra, Reports of Forests in the, 299, 306, 330
 Durbar at Delhi, for proclamation of Queen-Empress, 1877, 447

E

Eardley Wilmot, Mr. (now Sir S.), 604, 607
 Eardley Wilmot on the Oudh Forests, 367
 Edinburgh University, training of probationers at, 1866, 49, 52
 Education, progress of Forestry, 498
 Elephants, capture of, by Khedda Department, 229
 Elephants, suggested breeding establishment in Madras, 117
 Elgin, Earl of, Viceroy and Governor-General, 458
 Erosion, effects of protection on, 555-559
 Erosion following destruction of forests, 533, 537, 555-559
 Establishments in the Forest Department, 1864-8, cost of, 19
 Examination, entrance, for forest probationers, 502
 Executive Forest Officers, formation of service of, 79
 Executive Forest Officers, pay of, 80
 Executive forest staff in Burma, 1870, 209
 Executive or Subordinate Service, organization of, 493-495
 Executive staff, training of, 83, 86, 87, 169, 237, 504
 Expenditure, extraordinary, by the Forest Department, Governor-General's Memorandum on, 22-26
 Exploitation methods in Indian Forests, 510
 Exploitation, scientific methods of, 517
 Exploitation, regulation in methods of, 515

F

Famine in Chota Nagpur, 1865-7, 5
 Famine in the Ganjam district of Madras, 1865-7, 5
 Famine of 1899-1900, 460
 Famine of 1876-8 in Madras, Bombay, Central Provinces, and North-West Provinces, 447, 459

- Famine of 1896-7 in the North-West Provinces, Central Provinces, and Punjab, 459
 Famine, the Orissa, 1865-67, 5
 Felling in forests, destructive, 533
Ficus elastica forests in the Darrang District, 424
Ficus elastica plantation at Charduar, 573
 Financial reform measure of Lord Mayo, 7
 Financial Results of the Forests, 1864-99, 530
 Financial year, Forest Reports to be drafted for, 1865, 355
 Fire protection in Indian Forests, 116, 224, 242, 248, 293, 295, 319, 359, 361, 370, 533, 539-547
 Fire protection, nature of work, 544
 Fire protection, opposition to, 224, 539
 Fisher, Mr. W. R., Conservator of Forests and Assistant Professor of Forestry, Cooper's Hill, 501, 505
 Floating possibilities of Himalayan rivers, 301, 343
 Forest charges, area of, in India, 1869, 79
 Forest Conservancy, progress of, between 1871-1900, 443
 Forest Officer, position in district of divisional, 497
 Forest Officers, facilities for study in continental forests, 45, 169
 Forest Officers, training of French and German, 50, 55
 Forest organisation in India, 1864-70, 3
 Forest Reports, method on which to be drafted, 1868, 364
 Foresters, Scots, appointed to subordinate service, 1866-7, 44, 230
 Forestry, practical courses at Cooper's Hill, 503
 Forests, British, 47, 48
 Forests, distribution of "settled" forests in 1900, 474
 Forests, expenditure on administration of, 1870, 37
 Forests, Indian, regeneration of, 47
 Forsyth, Captain, Forest Officer, in the Central Provinces, 215, 224, 246
 Forsyth, on the distribution of the fauna in the Central Provinces, 219
 Forsyth, on the distribution of the sal tree in the Central Provinces, 217
 France, forests of, 47, 52, 79, 80
 France, pine plantations in the Landes, 98
 France, training of probationers in, 48
 Frontier wars, Hunza and Nagar and Manipur, 457
 Fuel and cow-dung in Madras, 93
 Fuel plantations in Madras, 93, 563
- G
- Gamble, C.I.E., F.R.S., Mr. J. Sykes, Conservator of Forests, appointed to charge of Dehra Dun School, 507
 Gamble, Mr. J. Sykes, 601, 602, 606
 Garhwal, forests of, 292, 302, 306, 317
 Girdling trees in the forests, correspondence on, 26, 90, 336
 Goalpara sal forests, 1869, 421
 Gorakhpur Forests, contents and division of (1866), 295
 Gorakhpur Forests, position in, 1921, 295
 Gorakhpur Forests, Webber's Report on (1865), 294
 Grazing in the forests, efforts to regulate, 306, 309, 355, 359, 361, 526, 533, 537, 547-555
 Guards, Forest, pay of, 82, 486
 Gumsur sal forests, 115
 Gurkha War and the Nepal Forests, 295
- H
- Haines, Mr. H. H., 606
 Hazara Forest Rules, 468
 Hazaribagh, forests of, 393
 Himalayan Forests, opening out communications in, 346, 351
 Historical position of India, 1871-1900, 445
 Historical review of period, 1864-70, 4-7
 Holderness, Sir Thomas, Bart., G.C.B., visits Siwalik Forests with Inspector-General, 557, 611
 Molkar, suggested lease of forests of, 233
- I
- Improvement fellings, 576
 Improvement of the forest crops, 575-591
Indian Forester, The, a magazine founded by Schlich in 1875, 602
 Indians and the Bombay Forest Department, 169

Indians, employment of, in forest service, 31, 77, 508
Inga dulcis, planting of, in Madras, 95, 97
 Inspector-General of Forests, officers filling post of, to 1900, 462
 Inspector-General, permission to correspond direct with Conservators, 40, 160
 Inspector-General of Forests, work and powers of, 495
 Inspectors-General of Forests, an appreciation of three, 612

J

Jaloun District Forests, 298, 306, 346, 348
 Jaunsar-Barwar, classification of forests of, 337, 339
 Jaunsar-Barwar Forests, the, 335
 Jaunsar-Barwar Forests, suggested rules for, 338
 Jhansi District Forests, Reports on, 296, 306, 346

K

Kashmir, forests of, 261
 Kashmir, suggested lease of forests of, 263
 Khandeish, forest policy in, 137, 138
 Kheddah or Elephant-catching Department, the, 432
 "Kheel" or shifting cultivation in Himalaya, 334
 Kulsi teak plantation, 573
 Kumaun, forests of, 292, 302, 306, 316

L

Lace, Mr. J. H., 600, 606
 Lahul, Forest Conservancy in, 270
 Lalitpur Forests, Reports on, 297, 306, 346, 348
 Lansdowne, Marquess of, Viceroy and Governor-General, 456
 Lawrence (Sir John, afterwards Lord), Governor-General, 4, 466
 Laws, Forest, 467
 Laydeker, Monsieur, and training of probationers in France, 48, 54
 Leases of forests from private owners, importance of obtaining, 361, 302
 Leather, Dr. Walter, appointed Agricultural Chemist, 608
 Leeds advocates forming teak plantations in Burma, 195, 196
 Leeds, Conservator in Burma, suggests return to license system, 181

Leeds, Mr. H., appointed Conservator in Bengal, 411
 License system and waste, 511
 List, first classification, of superior Forest Officers, 30
 Literature and Research, Forest, in India, 601-611
 Lumbering in Assam Forests, 428
 Lushai Hills, forests of, 403, 432
 Lytton, Lord, Governor-General, 446

M

Madras, attempt at fire protection in the Anaimalais, 224
 Madras, attitude of Collectors towards Conservancy, 101, 107, 121
 Madras, conservation of scrub forests for provision of fuel in, 97, 98
 Madras, demarcation of forests in, 109
 Madras, departmental working in, 122
 Madras, financial results of forests, 1869-70, 120
 Madras, fire in the Anaimalai Forests, 116
 Madras Forests, division of, in the 'sixties, 91
 Madras, fuel plantations in, 93, 115, 121, 563
 Madras, inefficiency of establishments in, 121
 Madras, Jungle Conservancy branch in, 107
 Madras, Manual of Forest Operations, the first, 90
 Madras, minor products of forests, 122
 Madras, Progress of Forest Administration in 1865-70, 90
 Madras, railways and fuel supplies, 99, 105, 108
 Madras, training of probationers for, 49
 Magistrates and forest offences, 534, 536
 Mahogany plantations in Bengal, 410
 Malaria and "kumri" cultivation, 166-69
 Manbhumi, forest of, 391, 394
 Mann, Mr. G., Assistant Conservator in Bengal, 371
 Mann, Mr. G., inspection of forests in Bengal, by, 405, 425
 Mayo, Lord, financial reform measure of, 7, 445, 447

- Mayo, Lord, Governor-General, 4, 7, 445
- Medical examination for probationers, 50
- Melghat Forest Reserve, selection and demarcation of, 253
- Minor produce, yield of, from forests, 523-530
- Muir, Sir William, reviews North-West Provinces Forest Report for 1867-8, 309
- Museum, Calcutta, help in research work from the, 609
- Mysore, demarcation of forests in, 127, 130
- Mysore, description of forests in, 125
- Mysore, division of forests in, 124
- Mysore Forests, returned to Maharajah, 451
- Mysore, progress of forest administration in, 1865-70, 123
- Mysore, minor products in, 132
- Mysore, Report on forests of, for 1868-9, 130
- Mysore, sandal wood in, 131
- Mysore State, Rendition of, to the Maharajah, 451
- N
- Nancy, Ecole Impériale Forestière, and Franco-Prussian War, 69, 72
- Nancy, French Forest School at, 50
- Nancy, training of probationers at, 50, 54, 69, 499
- Natives of India, eligible for superior grades, 31, 77
- Nanquette, Monsieur, Director of Nancy Forest School, 54, 76
- Nellore District, provision of fuel in, 95
- Nepal Forests, 295
- Nilgiri plantations, 115, 567
- Nilumbur teak plantations, 112, 563, 566
- Northbrook, Lord, Governor-General, 446
- North-West Provinces, appointment of Conservator necessary, 304
- North-West Provinces, canal plantations of, 307
- North-West Provinces, checking of grazing, 306, 309
- North-West Provinces, Commissioners acting as Conservators, 292
- North-West Provinces, demarcation of forests in, 306
- North-West Provinces, destruction of forests in, 294, 297
- North-West Provinces, "dhya" cultivation by Sahariyas in, 298
- North-West Provinces, financial results of forests, 305, 349
- North-West Provinces, Forest Report for 1866-7, 305
- North-West Provinces, Forest Report for 1869-70, 349
- North-West Provinces, forests of the Bhabar, 292
- North-West Provinces, introduction of fire protection, 296
- North-West Provinces, progress of Conservancy in, 292, 349
- North-West Provinces, provision of sleepers for railways, 309, 311, 314, 351
- North-West Provinces, Reports on forest of Kumaun and Garhwal, 292, 302, 316
- Nuddea Division, forests of, 386
- O
- Offences in forests, 534
- Ootacamund, "sholas" of, 118
- Organisation of forest staff, 485, 487
- Oudh, communications in forests, 356
- Oudh, demarcation of forests in, 353, 357, 358, 365
- Oudh, division of forests in, 357, 362
- Oudh, fellings in sal forests, 354
- Oudh Forest Report of 1865-6, 353
- Oudh Forest Report for 1867-8, 357
- Oudh Forest Report for 1869-70, 365
- Oudh, Forest Rules in, 359
- Oudh Forests, sal timber from, 313
- Oudh, Forest Staff in, 356
- Oudh, fuel requirements of people, 359
- Oudh, progress of Conservancy in 1865-70, 353
- Oudh, reservation of forests in, 353
- Oudh, rights in the forests, 355, 358, 366
- Oudh, works of improvement in the forests, 353
- P
- Padouk, Andamans, trade in, 513
- Palamow, sal forests of, 391, 424
- Patli Dun, forests of the, 317-321
- Patna Division, forests of, 381
- Pearson, Captain, Conservator in the Central Provinces, 215, 230, 239, 246, 248, 252
- Pearson, Colonel, the Father of the Service in 1922, 499

- Pearson, Colonel, supervised training of probationers, 499
- Pearson, Major, appointed Conservator in the North-West Provinces; 448, 305
- Pearson's Reports on Forests of North-West Provinces, 316-49
- Pests, insect and fungous, of the forests, 537
- Pests, insect and fungous, progress in protection, 559-562
- Pests, insect, in Indian Forests, Ribbentrop on the study of, 610
- Pests, study of forest insect, commenced, 609
- Pine forests of Himalaya, im, regnation of sleepers from, 257
- Pinus excelsa*, exploitation of, 272, 279
- Pinus longifolia*, East Indian Railway authorities lease, area of, forests in North-West Provinces for cutting sleepers, 299
- Pinus longifolia* forests of the North-West Provinces, 342, 343
- Pinus longifolia*, impregnation of sleepers of, 299, 514
- Pinus longifolia*, possible demand for, 303, 311
- Pioneers of the Forest Service, the, 442
- Plague, bubonic, appears in India, 1896, 458
- Plantations, area of, in India by 1900, 566
- Plantations, formation of, by the railway companies, 101
- Plantations in India, 112, 139, 140, 191, 195, 197, 200, 206, 209, 230, 240, 248, 250, 262, 272, 277, 283, 287, 352, 363, 367, 376, 405, 410, 425, 563-574
- Plantations of exotics, position of, 1869, 41
- Plantations, thinning of, 570
- Planting by private agency in Madras, 94
- Press Bill of 1878, 449
- Prince of Wales (late Edward VII) visits India, 1875-6, 446
- Probationers, age of selection of, 71
- Probationers, appointment in India of first trained, 70
- Probationers, Brandis on their training in India, 78
- Probationers, cost of training of, 86
- Probationers, effect on training by Franco-Prussian War, 68
- Probationers, entrance examination for forest, 502
- Probationers, first selection of, for training, 1867, 54
- Probationers for Imperial Service, training of, 499
- Probationers for Imperial Staff, possibility of training them at Dehra, 507
- Probationers, Government of India on training of, 58, 70, 71, 72
- Probationers, Highland and Agricultural Society opposes continental training of, 1870, 66, 67
- Probationers, Institute of Surveyors opposes continental training of, 1870, 6
- Probationers, medical examination for, 50
- Probationers, opinions of Lieutenant-Governor on training, 56
- Probationers opposition to training abroad, 52, 55, 57, 66
- Probationers, permanent recruitment of Department with trained probationers, 54
- Probationers, proposed educational course, 49, 59, 72
- Probationers, proposed examinations for, 53
- Probationers, reasons for training on Continent, 52
- Probationers, Royal Horticultural Society opposes continental training of, 1870, 66
- Probationers, Secretary of State on training of, 53, 65, 68, 69, 70, 72, 74, 87
- Probationers, training of, during Franco-Prussian War, 69, 499
- Probationers, training of, Indian Forest, 42, 45, 48
- Probationers, training of, in Hanover, 54, 499
- Produce, forest, amounts extracted from forests, 1880-98, 532
- Proprietorship of the State in the land, 464
- Protection of the Forest Officer, 535
- Protection of the forests, progress made in the, 533
- Provincial Service, organisation of the, 491
- Prussia, forests of, 47, 52, 79
- Punjab and the grazing question, 278
- Punjab, canal plantations in, 286
- Punjab, Cleghorn's review of, Forest Report of 1864-5, 262

Punjab, demarcation of forests in, 274, 275
 Punjab, division of forests in, 258
 Punjab, drift timber in, 274, 281
 Punjab, experiments with larch seed, 277
 Punjab, financial results of forests, 258, 281
 Punjab, Forest Report of 1864-5, 257
 Punjab, Forest Staff in, 264
 Punjab, fuel requirements of the Indus steamboats, 288
 Punjab, Himalayan deodar forests, 255, 258
 Punjab, ownership of windfall trees, 274
 Punjab, plains, forests, and fuel supplies, 283
 Punjab, plantations in, 262, 272, 277, 283, 287
 Punjab, progress of Forest Conservancy in 1865-70, 255, 261
 Punjab, railways and fuel supplies, 283-291
 Punjab railways and sleeper requirements, 289-291
 Punjab, sleeper and fuel requirements by railway, 257
 Punjab, Stewart's visits to the plains forests, 262, 275
 Punjab, the Hoshiarpur Forests in the, 280
 Punjab, the "rukh" fuel reserves, 275, 286, 288
Pterocarpus santalinus, plantation of, 113
 "Pyingado" forests of Arakan, 201, 211
 "Pyingado," timber of, for sleepers, 192, 513

Q

Quetta occupied by British, 1876, 448

R

Railways and fuel supplies, 99, 102, 140, 174, 251, 283
 Railways in the Punjab and North-West Provinces, construction of, 289, 309, 351
 Ramsay, Colonel, Commissioner of Kumaun, 27, 292, 446
 Ramsay, Colonel, value of his work in the forests, 305, 325
 Rangers, Forest, organisation of, 81, 486
 Read, Mr. F., appointed Conservator of Oudh in 1861, 353

Recruitment for superior service, 30
 Recruitment of Forest Department, methods of, in 1867, 51, 485
 Reorganisation of superior service, 1869, 30, 51, 61
 Reorganisation of superior service, 1869, cost of, 63
 Reorganisation of superior service, Madras and Bombay, 65
 Research Officer, first appointment of, in Indian Forests, 611
 Research work in insect pests of the forests, Ribbentrop organises, 610
 Revenue Secretariat, Forest Department transferred to, 456
 Reynolds, Mr. W. H., work of, in Forest Survey branch, 480, 484
 Ribbentrop, Mr. B., appointed to service, 1867, 44, 462
 Ribbentrop, Mr. B., becomes Inspector-General, 462
 Ribbentrop's *Forestry of British India*, 474, *et seq.*
 Ribbentrop, the Upper Burma teak forests and, 512
 Ribbentrop, silviculture in India and, 503
 Rights in the forests, 472
 Ripon, the Marquess of, Viceroy and Governor-General, 450
 Roberts, V.C., Field-Marshal Lord, on the Indian Forests, 466
 Rules, Forest, for Berar, Coorg, and Bengal, 469
 Rules, Forest, made under the Acts, 12, 473
 Rules, Local, made under the Indian Forest Act (1865), 12
 Rules regarding appointments, etc., to superior service, 30
 Rupee and compensation allowance, the, 457
 Rurki Engineering College, 83, 504
 Reporter on Economic Products, 608
 Research, Forest, in India, 601-611

S

Salaries for trained Forest Officers, 51
 Sál forests of Chota Nagpur, 391
 Sál forests of Kumaun and Garhwal, 316
 Sál forests of Oudh, 364, 362
 Sál forests of the Dun, 299, 306, 330, 577
 Sál forests of Tista Valley, 373, 407
 Sál, girdling of, 27, 28
 Sál, price of, in Oudh, in 1865, 355
 Sál, rate of growth of, 362

- Sál tree in the Central Provinces, distribution of, 217
- Salt customs hedge abolished, 1879, 447
- Satpura Range, destruction of forests on, 246
- Saw mills, introduction of, into forests, 239
- Schlich, Dr. (later Sir W.), appointed to service 1867, 44, 462
- Schlich, Dr., appointed Professor to initiate training of Indian Forest probationers at Cooper's Hill, 500
- Schlich, Dr., becomes Inspector-General, 462
- Schlich, Dr., on changes in education of probationers, 501
- Schlich, Report on "pyingado" forests of Arakan by, 201, 211
- Schlich's scheme for centralising control of working plans under the Inspector-General, 597
- Schlich, transferred from Burma to Sind, 1870, 175
- School, Dehra Dun Forest, formation of, 505
- School, Forest, education given at and management of, 506
- School, Forest, for India, 53, 83, 89, 505
- Scotch Forests, training of probationers in, 49, 50, 76
- Secretary of State and forest conservation, 465
- Secretary of State and the Indian Forests, 292, 418
- Settlements, Forest, 475
- Settlements, results of forest, to 1900, 474
- Settlement Work, Forest, description of, 476
- Shifting cultivation, progress in stopping by, 1900, 538
- Ship-building, crooked timber for, in Britain, 92
- Ship-building, crooked timber for, in Madras, 91
- Sikkim, Conservancy of Forests in, 371, 374, 375, 405, 411, 425
- Sikkim Forests, timbers and prices, 406
- Sind, Brandis visits forests in 1867-8, 174
- Sind, co-operation of Civil and Forest Officers in, 173
- Sind, effect of Indus River on forests, 172, 175
- Sind, first two trained Forest Officers join in, 175
- Sind, Forest Report for 1865-6, 171
- Sind, Pengelly's proposals for training the Indus, 175
- Sind, progress of Conservancy in, 1865-70, 171
- Sind, provision of sleepers and fuel for railways, 174
- Sind, rates for sleepers and fuel in, 177
- Sind, Schlich transferred from Burma to, 1870, 175
- Sind, successive "coupe" fellings in, 172
- Sind, the Secretary of State and the tigers, 180
- Singbhum, sál forests of, 391, 395
- Sissu plantations in the Punjab, 571
- Siwalik, forests of the, 330
- Slides, timber, 521
- Smythies, Mr., appointed to Forest School, 505
- Southal Pergunnahs Division, forests in, 380
- Staff, organisation of forest, 485, 487, 497
- Stewart, Dr., appointed Conservator in the Punjab, 255
- Stray leaves from Indian Forest*, 603
- Sundarbans Forests, the, 386, 424
- Survey Branch, Forest, creation of, 480
- Survey Branch, Forest, work and cost of, 481-484
- Surveys, Forest, progress of, 479
- Sylhet District, forests of, 396
- Sylvicultural operations in the forests of sál, deodar, teak, khair or cutch, iron-wood, padouk, sandal wood, sissu, *Acacia arabica*, the pines, silver fir, spruce, W. Himalayan oaks, and *Juniperus excelsa*, 577-591

T

- Teak, a rare product in Madras Presidency, 90
- Teak forests of the Central Provinces, 222
- Teak, girdling of, 26
- Teak plantations, 112, 139, 140, 191, 195, 197, 200, 206, 209, 230, 240, 248, 250, 426, 564, 565, 567, 572, 573
- Teak, rate of growth of, in Burma, 195, 202
- Teak timber, yield of, in Burma, 192
- Teori Garhwal State Forests, lease of, 257

- Temple, Chief Commissioner of the Central Provinces, 235, 245
 Tenancy Acts of Bengal, Oudh, and the Punjab, 455
 Tirunhally Temple, claim to forests by Trustees of, 110
 Timbers, Indian, commonly exploited by 1900, 510
 Tista River, suggested floating logs down, 373, 377, 407, 409
 Tons and Rupin Rivers Forests, Reports of, 299, 342, 344, 351
 Tons River Forests and the Rajputana Railway, sleepers from, 341, 345
 "Toungya" cultivation and the formation of teak plantations, 209, 426, 568
 "Toungya" cultivation in Burma, 201
 Trade depression and the Forestry Department, 6
 Twenty-four Pergunnahs, forests of, 387
- U
- United Provinces, *vide* North-West Provinces
- V
- Valuation Surveys, Brandis' method of, 162, 236, 242, 270, 353, 356, 425
 Victoria, Queen, proclaimed Queen-Empress, 1877, 447
- Village forests, provision of, in India, 307, 355
 Villages and the waste lands, 465
 Vindhya Range, forests of, 347, 349
- W
- Warth, Dr., appointed on Dehra Dun Staff, 607
 Waste lands, afforestation of, by 1900, 574
 Watt, Sir George, C.I.E., Reporter on Economic Products, 608
 Webber, Reports on forests of North-West Provinces, 292, 302
 Wood, Capt. E. S., Conservator in Oudh in 1864, 353
 Wood, Sir Charles, Secretary of State for India, 292
 Working plan, Brandis' first, for Burma, 593
 Working plan, the first, 592
 Working plans, area under, in 1899 in India, 598
 Working plans, introduction and growth of, 592-600
 Working plans, McClelland's proposals, 592
 Working plans, progress under Brandis, 595
- Y
- Yield of produce, 523

